288355

CLIMATE

Ontario

CONTENTS

Message from the Minister of the Environment	1
Executive Summary	4
SECTION 1: Global Solutions — Made in Ontario	**11**
Building a Clean Energy Future	13
Conserving our Water, Land and Forests	20
Promoting Transportation Efficiency	25
SECTION 2: Working Together — Ontario's Partners	**30**
Municipalities and Local Communities	31
Schools, Colleges and Universities	33
Business and Industry	34
Agriculture and Forestry	35
SECTION 3: Ensuring Transparency and Progress	**36**
SECTION 4: Conclusion	**39**
APPENDIX 1: The Numbers	**41**

Front cover inset photos:
Top left: GO Transit
Bottom right: Ontario Tourism Marketing Partnership Corporation

© Queen's Printer for Ontario, 2011 PIBS 8290e

Message from the Minister of the Environment

John Wilkinson, M.P.P.

I am pleased to report that here in Ontario we are making real progress on some of the world's most pressing climate change issues. We are not sitting back and waiting. Our government understands that a healthy environment is absolutely critical to creating a cleaner, stronger, more sustainable future for all Ontarians.

There is no question that the effects of climate change are already here and having an impact on our everyday lives — we are seeing more frequent and intense weather events, shorter duration of ice cover on lakes and fluctuating water levels in our lakes, rivers and streams.

That is why in Ontario we are taking strong, immediate action now so that our children and our grandchildren inherit a healthy environment and a strong economy in decades to come.

I invite you to read this report, our third annual report on climate change in which we profile key actions Ontario is taking and the success of our efforts so far.

We have some good news to share — for 2009, Ontario's total greenhouse gas (GHG) emissions are expected to be near or below 1990 levels. We anticipate that, including initiatives launched to date, we will deliver more than 85 per cent of the reductions needed to reach our 2014 target.

I hold the firm belief that it is this province's openness to innovation as well as courage to change that is helping us address many aspects of climate change.

I hold the firm belief that it is this province's openness to innovation as well as courage to change that is helping us address many aspects of climate change. We only need to look at our Green Energy Act and our commitment to eliminate coal-fired electricity generation by the end of 2014 as great examples.

Our Green Energy Act is widely regarded as the most innovative and ambitious piece of clean energy legislation in North America, expanding Ontario's use of clean, renewable energy. In the past year, Ontario has attracted $16 billion in private sector investment in renewable energy generation projects. By the end of 2012, it is estimated that up to 50,000 direct and indirect jobs in smart grid transmission and distribution upgrades, renewable energy generation and conservation will have been created or supported as a result of the act. The kind of interest we're seeing in Ontario's clean energy sector is only going to lead to more investment, more growth and more good jobs for Ontarians.

We permanently shut down four coal-fired units this year, the equivalent of removing up to two million cars from Ontario's roads. Without a doubt, this represents a significant contribution to cleaning the air our children breathe.

Our Water Opportunities and Water Conservation Act received royal assent in November 2010. It sets a framework to help make Ontario the North American leader in the development and sale of clean water technologies and services. The act will also help Ontarians use water more wisely and sustain Ontario's water infrastructure through planning that takes into consideration the risks of climate change.

In Ontario we are moving quickly and in the right direction. Yet we know that more needs to be done.

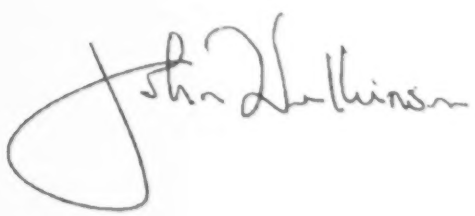
There is no doubt that the global community as a whole must do more. Climate change is an issue that affects every continent, country, community and individual. And in Ontario we need to do more — we are in the process of taking a look at many other opportunities, especially around sustainable transportation. Cars and trucks are a growing source of GHG emissions in this province and throughout North America.

I cannot stress enough, however, the importance of individual actions — they do make a big difference.

I cannot stress enough, however, the importance of individual actions — they do make a big difference. Change and momentum often come from the community, from grassroots organizations and from within our own homes, from ideas generated around the dinner table.

This is why our government continues to invest in local efforts to fight climate change. There are great examples everywhere of Ontarians taking up the climate change challenge.

With this in mind, I invite you to read our progress report on climate change, and look forward to working with all of you on making our vision of building a greener future — a future with healthy communities and a strong economy — a reality.



John Wilkinson
Minister of the Environment

CLIMATE CHANGE: THE WORLD'S TOP CHALLENGES FOR MITIGATION AND ADAPTATION

1

According to the International Energy Association, fossil fuels account for most global greenhouse gas (GHG) emissions. **Coal is the number one source** of global emissions from fossil fuels, accounting for nearly a third of all global GHG emissions.

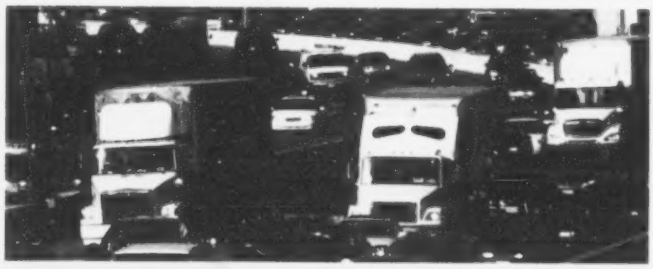
"Fossil fuels remain the dominant sources of energy worldwide, accounting for 77 per cent of the demand increase in 2007-2030. In 2007-2030, demand for coal grows by 53 per cent."

Energy Information Administration, *Annual Energy Outlook*, 2009

In the U.S., 50 per cent of electricity comes from coal-fired power; in China that number rises to 80 per cent.

2

Vehicles account for 13 per cent of global emissions. Transportation overall is a rising source of emissions across North America. This includes many Canadian provinces, including Ontario, where emissions from transportation fuels account for 30 to 40 per cent of total emissions.



3

"Without resolute action, climate change will overstretch the adaptive capacities of many societies in the coming decades."

United Nations Development Program. *Charting a New Low Carbon Route to Development*, 2009

In many parts of the world water scarcity, water quality, declining food production and intense storms will be the major climate issues of this century.

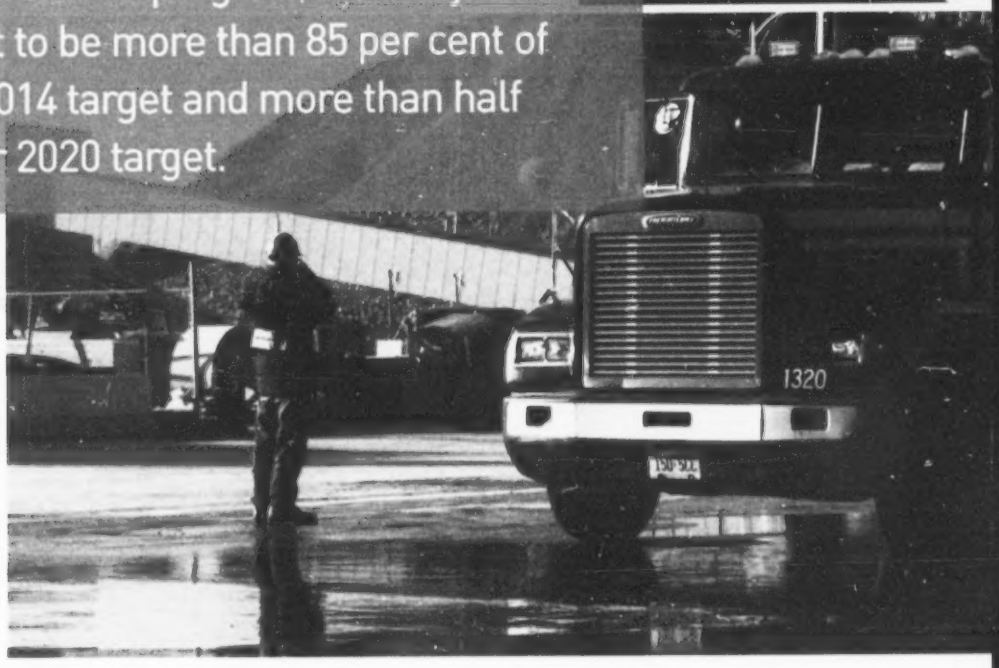
"Climate change will compound existing water scarcity problems... increasing the number of people suffering from water stress and reduced access to safe drinking water. It will have an impact on rain-fed and irrigated agriculture, affecting both local cropping patterns and international production and trade."

Deforestation, the vast majority of which occurs in developing countries, accounts for 17 per cent of global emissions.

Stewardship of the world's forests would significantly reduce global emissions. This includes preventing deforestation and supporting afforestation (tree planting). While progress is being made, details and funding for an international agreement on avoided deforestation are not yet in place. With each year of delay, the problem grows bigger.

EXECUTIVE SUMMARY

This report highlights the progress Ontario has made in reducing emissions. Our current expectations are that 2009 emissions will be at or near 1990 levels, despite significant growth in our GDP, our population and our numbers of homes and cars. With programs already in place, we expect to be more than 85 per cent of the way to our 2014 target and more than half of the way to our 2020 target.



INTRODUCTION

Climate change is a global challenge, requiring large-scale solutions backed by both the government and private sectors. Yet it is also a challenge that starts in every home in every community — and calls for small, everyday actions by every citizen. We all contribute to climate change; we can all be part of the solution.

In Ontario, we have been taking action on a number of fronts to meet the challenges of climate change. In particular, we are seeking solutions to global challenges in three core areas:

- Clean energy and energy conservation
- Stewardship of water, lands and forests
- Sustainable transportation.

Ontario is showing leadership in all of these areas.

Former U.S. Vice President Al Gore calls Ontario's Green Energy Act, 2009,

"The single best green energy program on the North American continent." [1]

We are now working towards phasing out the use of coal in generating electricity by the end of 2014. We are taking action to protect and conserve our water sources. We are working to protect our green spaces and develop sustainable plans for land use. We are investing in transit systems for our urban areas and providing incentives for electric vehicles. And, we are supporting research and innovation through the Ontario Emerging Technology Fund, the Ontario Network of Excellence (ONE), and other initiatives.

In the pages of this annual report, you will learn about the key actions Ontario is taking and the success of our efforts so far. While we have been making progress, we recognize that **success will take ongoing effort**. This report will highlight the further steps we will now take together with our partners to support our climate change goals and our vision of a clean and low carbon economy. We will continue to collaborate with all sectors of our economy and engage all Ontarians.

As we work toward achieving our goals on climate change, **we are working to create a sustainable future for Ontario** — a green legacy for us, our children and their children. The goal: to ensure that all Ontarians will enjoy a high quality of life sustained by a healthy environment and a clean, innovative economy for generations to come.

1 Jenny Yuen, *Gore Green with Envy*, Toronto Sun 25 Nov. 2009, torontosun.com/news/canada/2009/11/25/11915481-sun.html

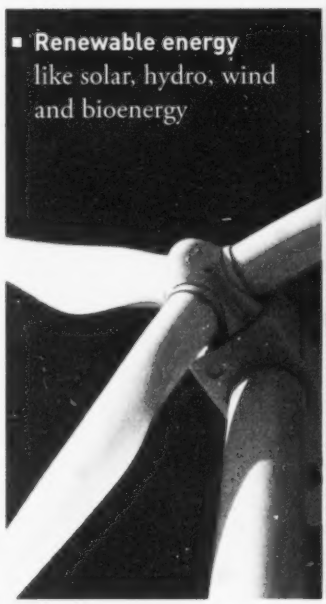
Our vision for Ontario

As part of a sustainable future, we aim to create an Ontario that is:

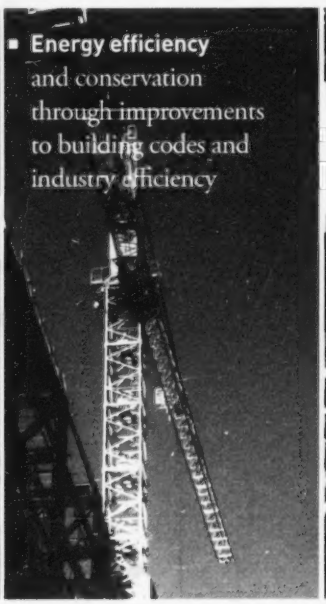
- A world leader in clean, renewable energy, energy and water conservation, clean water technologies and wise stewardship of our lands and forests
- Able to ensure healthy ecosystems that sustain biodiversity and support human uses and enjoyment
- Mobilized to build a smarter, more efficient and sustainable transportation system for the future
- Prepared for the impacts of climate change and ready to take action to minimize the risks to citizens, the environment and the economy.

Ontario: Finding global solutions

The global GHG reductions needed by 2020 could almost all be achieved if countries would implement policies to promote:

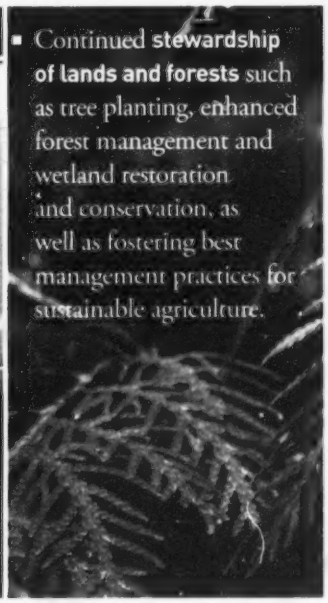


- **Renewable energy** like solar, hydro, wind and bioenergy



- **Energy efficiency** and conservation through improvements to building codes and industry efficiency

- **Sustainable transportation** including low carbon fuels and electric vehicles



- Continued **stewardship of lands and forests** such as tree planting, enhanced forest management and wetland restoration and conservation, as well as fostering best management practices for sustainable agriculture.

Well planned, early action will reduce costs, prepare us for changes in climate, and ensure continued sustainable economic development. Ontario is taking leading action in all of these areas.

(McKinsey & Company. *Pathways to the Low Carbon Economy*, 2009.)

OUR PROGRESS **SO FAR**

In 2007, Ontario introduced its Climate Change Action Plan as the framework for action to reduce GHG emissions. This plan established specific GHG reduction targets that reflect the need for progress now and ongoing action over time. Our progress so far has been steady and strong. Highlights include:

- **Our strategy to eliminate the use of coal to generate electricity; and the Green Energy Act, 2009.** Ontario's plan to phase-out coal by the end of 2014 is the single largest climate-change initiative in North America, while the Green Energy Act boasts the most comprehensive feed-in tariff program in North America. Together, these are the most aggressive policies anywhere on the continent for eliminating coal emissions and promoting clean energy investments.
- **Record investments in transit, incentives for electric vehicles and provincial land use policies.** These have all helped set the stage for a more sustainable future.
- **The Places to Grow Act, 2005, the Far North Act, 2010, and the Water Opportunities Act, 2010,** strengthen the existing legislative framework that ensures we protect and conserve our forests, lands and water.
- **Attracting $16 billion in private sector green investments as well as investment in local manufacturing.** By advancing low carbon policies, we are making our province an attractive place for green investment and we are generating new jobs. The United States, China, South Korea and the European Union have all invested heavily in low carbon economic development. In Ontario, we have positioned ourselves to take advantage of global clean energy investments.
- **Significant new job creation.** The Green Energy Act, 2009, including the feed-in tariff program is projected to create or support up to 50,000 direct and indirect jobs by the end of 2012.
- **Ontario is working with leading North American jurisdictions to develop a cap-and-trade program** to be ready to participate in the emerging carbon market. We have put in place a GHG-reporting regulation for large emitters and the legislation needed to establish a cap-and-trade program. We continue to consult with a variety of stakeholders, including industry and environmental organizations, and participate in leading regional programs like the Western Climate Initiative that will link with other regional and international programs over time.

Ontario's plan to phase-out coal by 2014 is the

single largest climate-change initiative

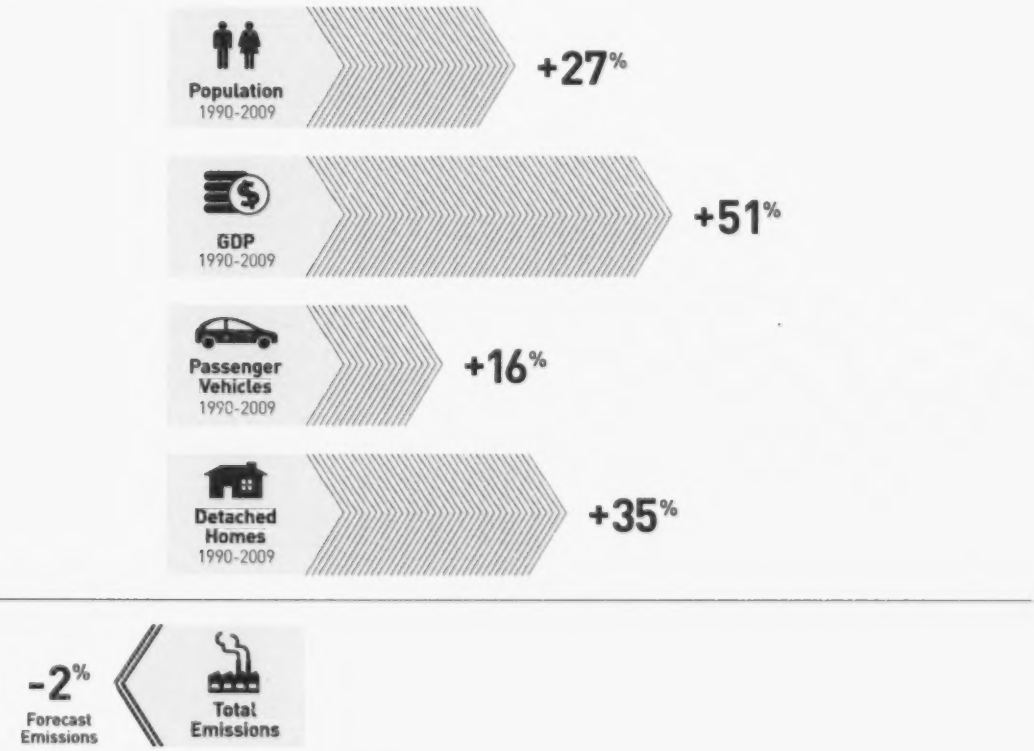
in North America.

These are just some of the ways that Ontario is building the economy of the future and helping to lower GHG emissions both in Canada and in North America. Our actions are resulting in progress towards reducing emissions to six per cent below 1990 levels by the end of 2014. **Already, for 2009, Ontario's GHG emissions are projected to be near or below 1990 levels.**

This drop in emissions is the result of the phase out of coal-fired electricity generation and other climate change initiatives, as well as the recent economic downturn. Ontario has achieved these reductions despite two decades of significant growth in population, housing, vehicles, industry and GDP. These are all key drivers in rising GHG emissions.

Figure 1 below sums up the province's growth over the last two decades. It also shows the drop in total emissions compared to levels in 1990.

FIGURE 1.
ONTARIO'S GROWTH AND TOTAL EMISSIONS, 1990-2009



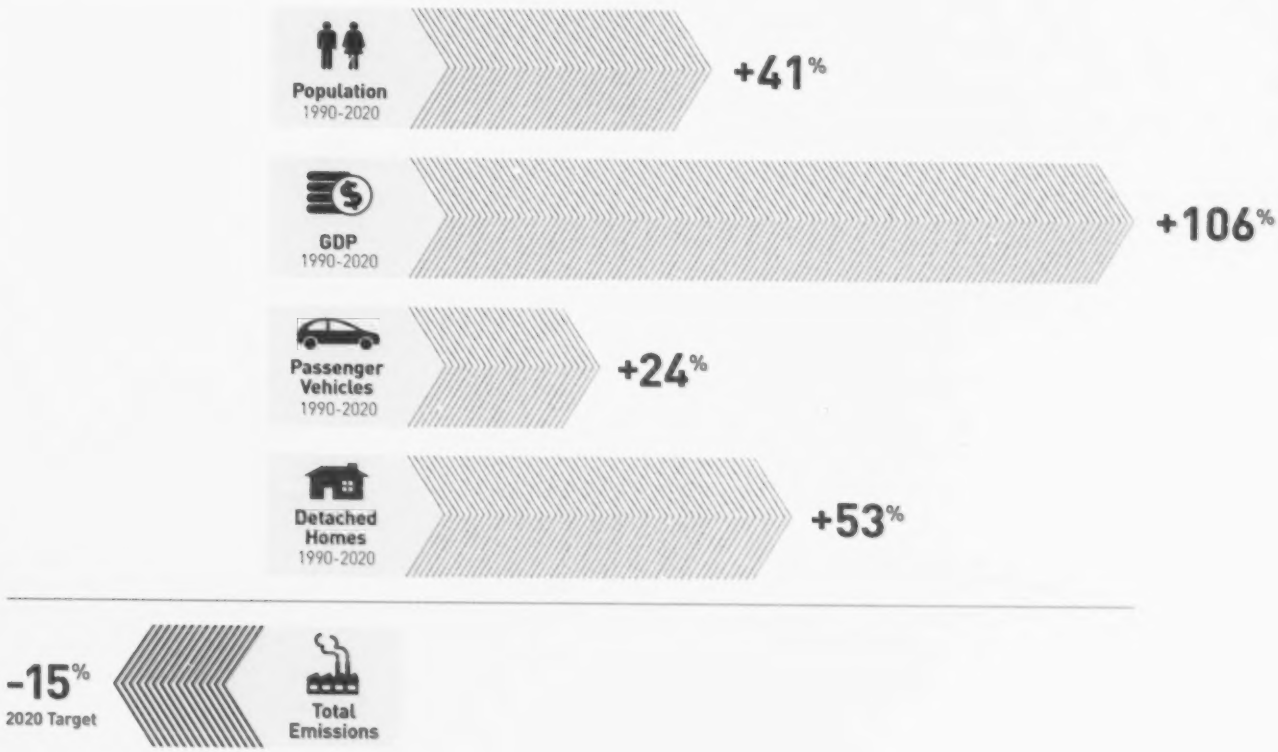
LOOKING **AHEAD**

Ontario is now emerging as a leader in tackling some of the world's most pressing climate change issues. **We are making solid progress in reducing GHG emissions. Current forecasts show that including initiatives launched to date will take us more than 85 per cent of the way towards our 2014 target.** But we know that we have to address many challenges in order to make further progress.

First, we face the challenge of continued growth. Figure 2 below shows the province's projected growth to 2020. It also shows our goal to reduce total emissions even further in the same time period.

Second, we will have achieved the greatest reduction in emissions so far from our work to completely eliminate the use of coal to generate electricity by the end of 2014. This strategy will reduce GHG emissions by almost 30 megatonnes. Moving forward, however, no other single action will yield such dramatic results. We will have to mobilize across many areas so that, cumulatively, we can reach our 2020 and 2050 targets.

FIGURE 2.
ONTARIO'S PROJECTED GROWTH AND TARGET EMISSIONS, 2020



For example, in the transportation sector we face even more complex issues that may take time to yield significant progress in reducing emissions. The transportation system we have today evolved over many decades.

Therefore, as we look ahead to 2020, we must not only consider the potential for short-term emission reductions. We must also consider the broader potential of a green Ontario in the years ahead. Building on low carbon policies today will give us a competitive advantage tomorrow.

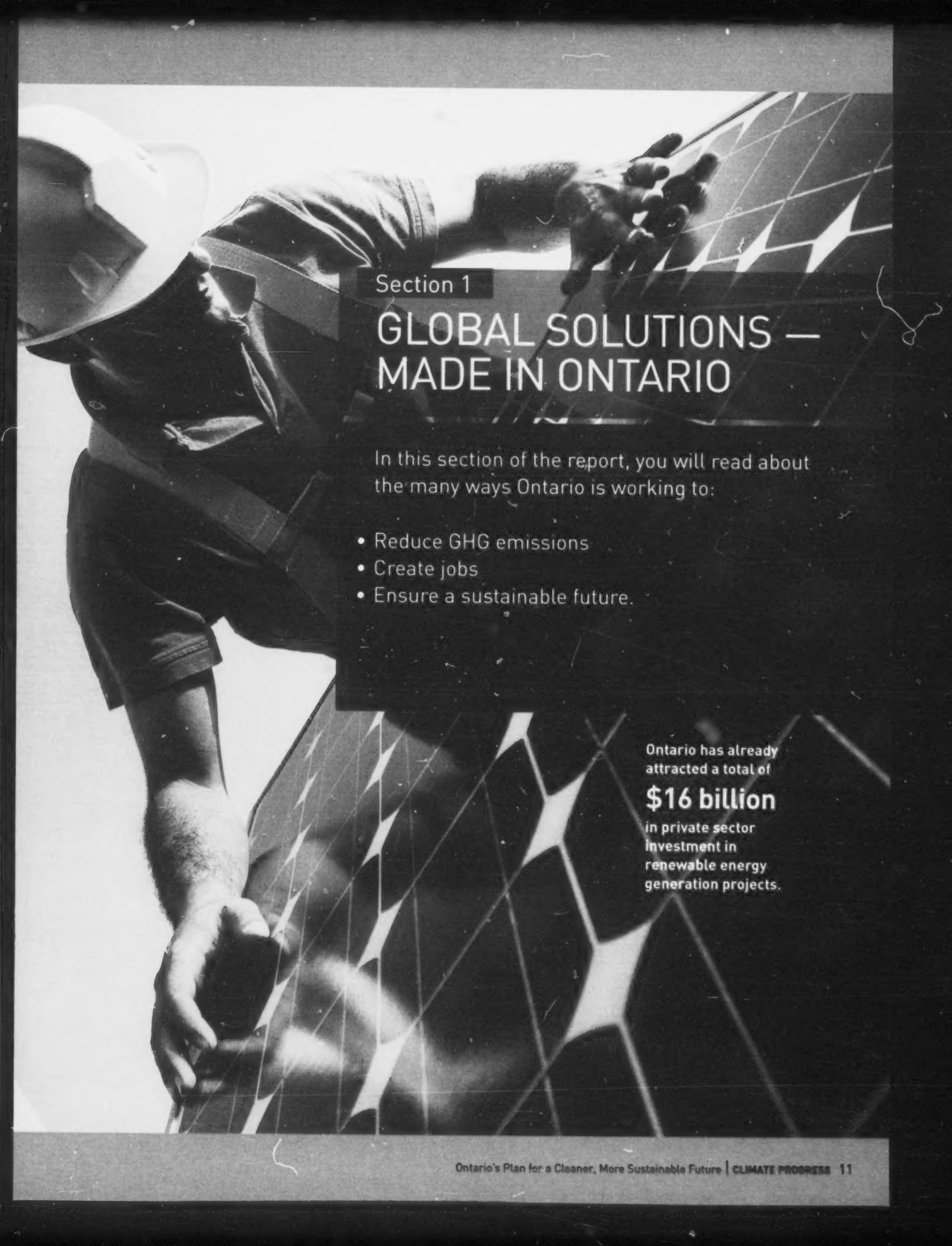
Our climate change actions are designed to create jobs; to build even more liveable, sustainable communities; and, to achieve longer term GHG reductions in the decades to come. Yet we know we cannot achieve our vision alone. In addition to government actions, we are seeing examples of green leadership all across the province. Municipalities, industries, small businesses and farms, schools, universities and colleges, communities and individual Ontarians are all getting involved.

Their actions — combined with actions such as phasing out the use of coal and investments in renewable energy and efficiency — are making a contribution to reducing emissions in Canada. They are also stimulating the Canadian economy as a whole. We will continue to work together so that we can all do our part to reduce provincial, national and global emissions.

According to Ernst and Young, global investments in clean energy surpassed investments in conventional fuels for the first time in 2009. Clean technology investments continue to surpass most other sectors.

Next steps

- New renewable energy projects, energy efficiency and conservation, as well as job creation under the Green Energy Act, 2009
- New regulations to expand and increase energy efficiency
- Collaboration with electricity and natural gas companies to enhance energy efficiency programs
- Proceed with a strategy and action plan on climate change adaptation
- Continue developing a cap-and-trade program to achieve emission reductions and support the transition to a low-carbon economy. This may also include working with key Canadian and U.S. partners on a coordinated approach to infrastructure and administrative support which could entail establishing a regional administrative organization
- Seek advice from the Premier's Climate Change Advisory Panel on creating a more efficient transportation system
- Key local initiatives, including a climate change adaptation strategy for the Lake Simcoe watershed
- New international partnerships
- Further opportunities for public engagement.



Section 1

GLOBAL SOLUTIONS — MADE IN ONTARIO

In this section of the report, you will read about the many ways Ontario is working to:

- Reduce GHG emissions
- Create jobs
- Ensure a sustainable future.

Ontario has already attracted a total of

$16 billion

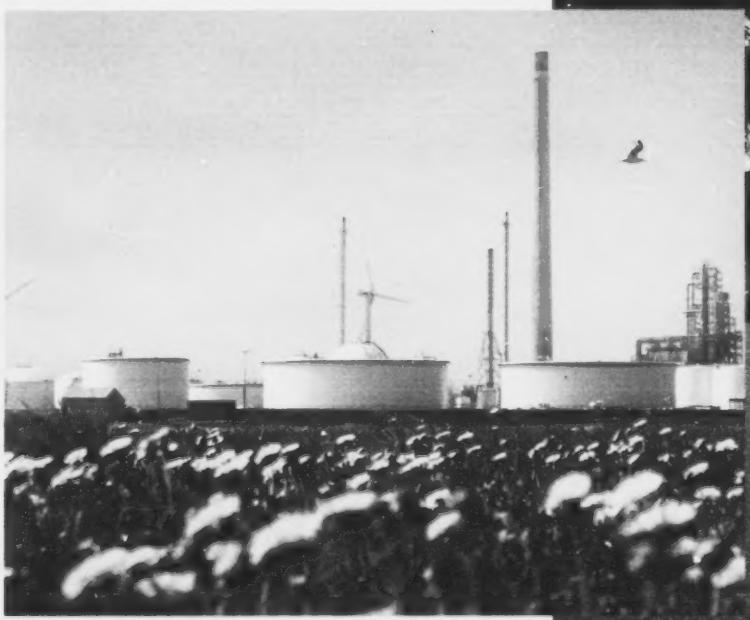
in private sector investment in renewable energy generation projects.

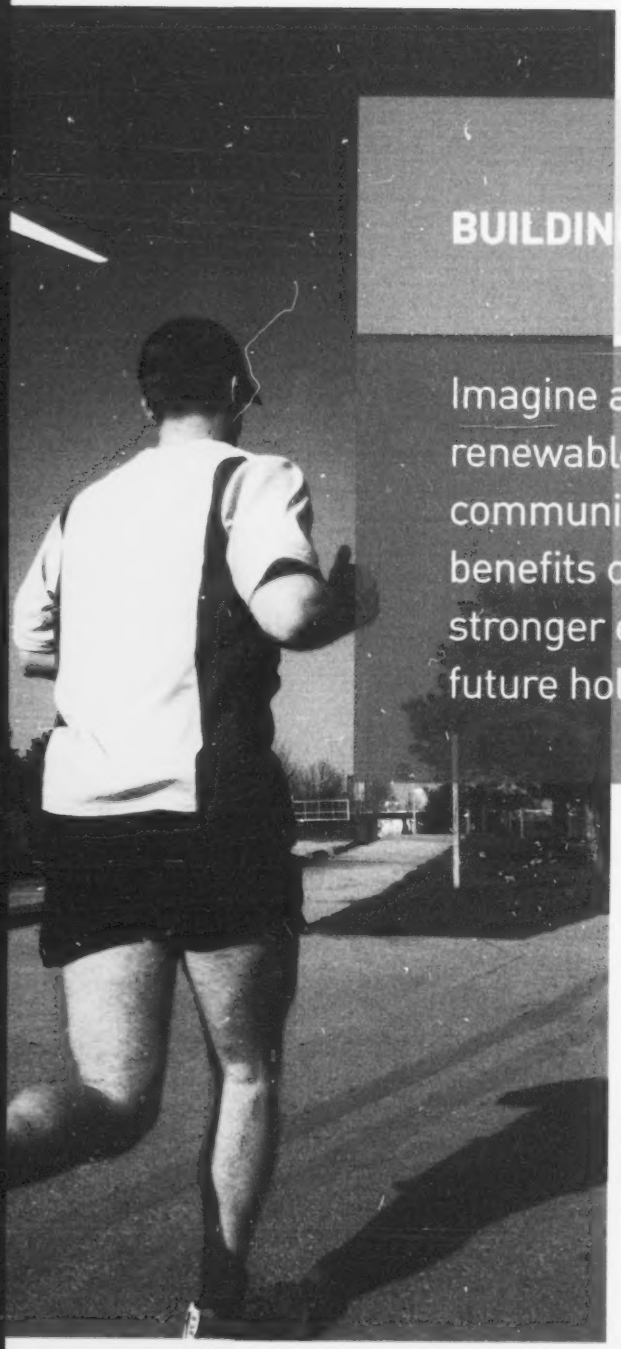
CAP AND **TRADE**

Cap and trade is a form of market-based regulation that sets an overall limit on emissions and then allows the regulated community to work together to collectively achieve required reductions at lowest cost. It provides incentives to use energy more efficiently, invest in low emitting technologies, and find low cost methods to reduce emissions.

Many jurisdictions recognize the flexibility that a cap-and-trade program can provide to industry, enabling reliable reductions to be achieved at low cost, and promoting energy efficiency, which can lead to reduced operating costs and increased productivity. The European Union has been operating a greenhouse gas cap-and-trade program for industry and electricity since 2005 and New Zealand's Emissions Trading Scheme began in 2008. Emerging economies like China and India are also exploring cap and trade. Here in North America, the Regional Greenhouse Gas Initiative, made up of northeastern U.S. states, has been operating a cap-and-trade program for the electricity sector since 2009. Meanwhile, the Western Climate Initiative (of which Ontario is a member) continues to make progress developing a regional cap-and-trade program. Ontario remains committed to a cap-and-trade program and will be joining the regional emissions trading program after the scheduled start in 2012.

While the Ontario government can enable these actions through its policies and programs, such as cap and trade, it is the efforts of all Ontarians working together that will make our vision a reality.





BUILDING A CLEAN ENERGY FUTURE

Imagine a province that is powered by clean, renewable energy... where we enjoy healthier communities, and healthier lives... and all the benefits of new sources of employment and a stronger economy. This is part of what Ontario's future holds. We are making it a reality today.

Globally, coal is the largest and fastest growing source of GHG emissions from fossil fuels. In Ontario, we can be proud of our record as the first in Canada and **one of few jurisdictions in the world committed to eliminating the use of coal in electricity generation by the end of 2014**. We are fully on track to achieve that goal.

That's not all. Environment Canada's National Inventory Report[2] recognizes that Ontario's program to eliminate the use of coal to generate electricity has made **a major contribution to lowering Canada's GHG emissions.**

To support this effort, Ontario is hard at work to increase its supply of renewable energy. Our efforts continue to:

- Replace coal with other renewable sources, such as wind, solar, water and bioenergy
- Enable new low carbon industries to attract investments and jobs
- Foster research, development, and deployment of new cutting edge technologies
- Promote skills development to meet new business demands
- Create supporting policy to make sure that after coal is phased out, our electricity emissions stay down
- Provide new opportunities for community economic development.

OUR PROGRESS **SO FAR**

Ontario has now made significant progress in reducing GHG emissions. In 2009, coal-fired electricity generation reached a 45-year low. Emissions of CO_2 (carbon dioxide) from coal plants decreased by more than 70 per cent between 2003 and 2009. In 2003, emission levels were at record highs.

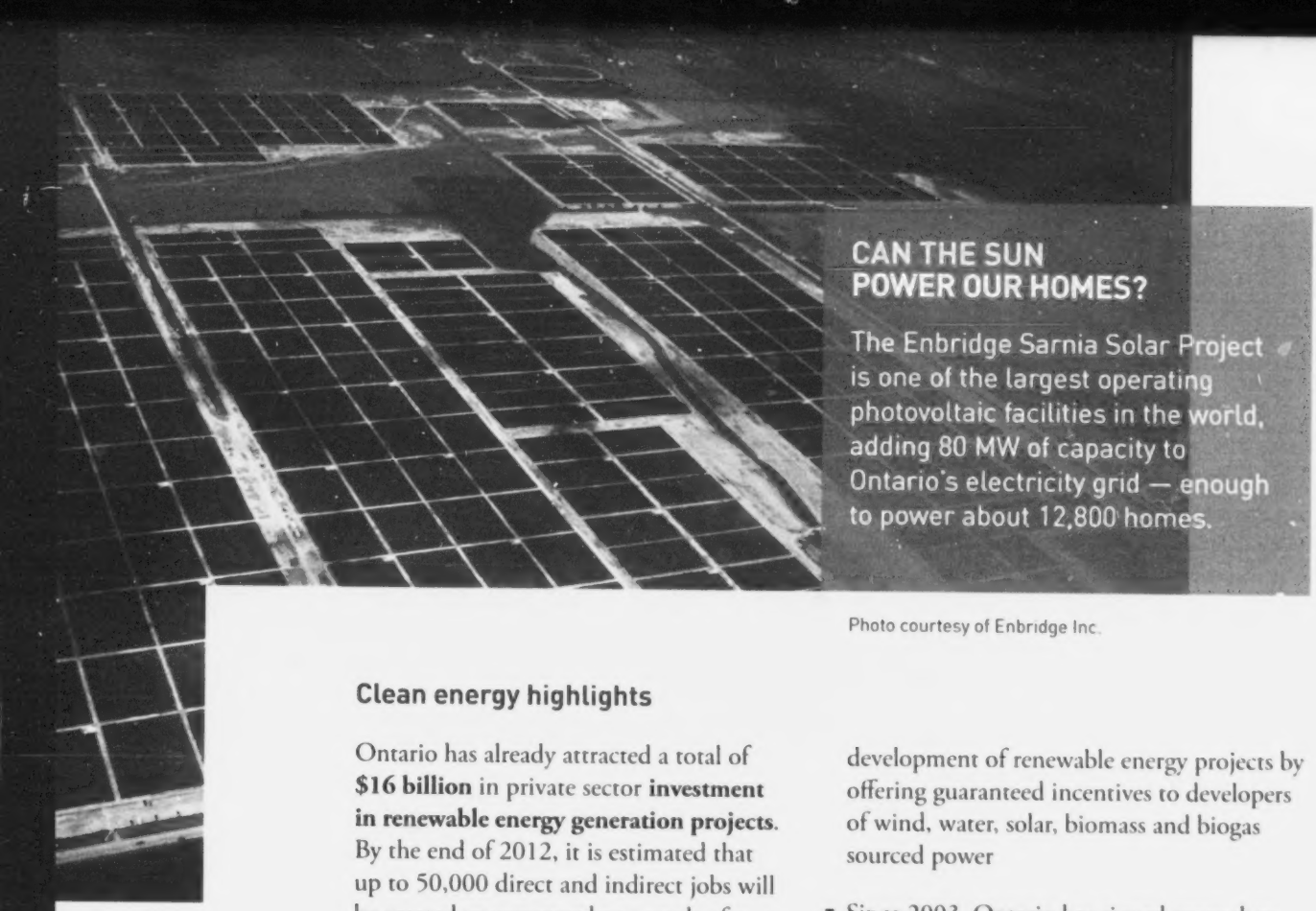
We have achieved these results through two types of initiatives:

1 Our clean and renewable energy programs

2 Our energy conservation programs.

The following is a list of highlights in each area.

2 Environment Canada, "*National Inventory Report 1990-2008: Greenhouse Gas Sources and Sinks in Canada*", (Ottawa: Environment Canada, 2010)



CAN THE SUN POWER OUR HOMES?

The Enbridge Sarnia Solar Project is one of the largest operating photovoltaic facilities in the world, adding 80 MW of capacity to Ontario's electricity grid — enough to power about 12,800 homes.

Photo courtesy of Enbridge Inc.

Clean energy highlights

Ontario has already attracted a total of **$16 billion** in private sector **investment in renewable energy generation projects**. By the end of 2012, it is estimated that up to 50,000 direct and indirect jobs will be created or supported as a result of our policies and programs in smart grid and transmission and distribution upgrades, renewable energy and conservation. Recent initiatives include:

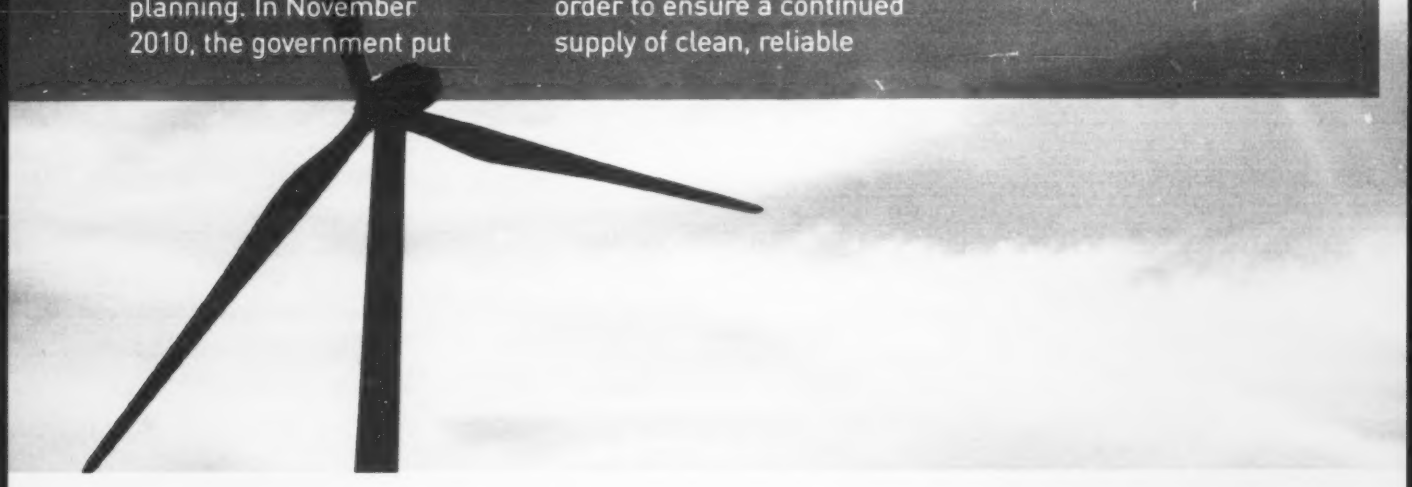
- We put forward an updated Long-Term Energy Plan (LTEP) to guide Ontario's electricity system towards a clean energy future
- We closed four coal-fired generation units in October 2010. **Coal will not be used to generate electricity by the end of 2014**
- The Legislature passed the Green Energy Act, 2009. The act will help ensure Ontario's economic future by attracting new investment in the renewable energy sector, creating well paying clean energy jobs and better environmental protection
- In 2009, Ontario launched North America's first comprehensive feed-in tariff (FIT) program. This program aims to increase our renewable energy supply, encouraging the development of renewable energy projects by offering guaranteed incentives to developers of wind, water, solar, biomass and biogas sourced power
- Since 2003, Ontario has signed more than 19,000 contracts with wind, water, solar and bio-energy sources totalling more than 5,000 MW of renewable energy.

Other important initiatives include:

- We launched the Aboriginal Energy Partnerships Program. This program supports Aboriginal communities considering projects to create clean energy. To date, eight grants have been awarded for Aboriginal projects in six communities across the province. The grant recipients include four hydro-electric, one solar, one wind and two biomass projects
- We launched the Community Energy Partnerships Program. This program makes it easier for communities to develop clean energy programs. To date, 22 community-owned projects have received $1.7 million in grants for projects anticipated to generate 34 MW of power each year, enough electricity to power about 10,000 homes.

ONTARIO'S LONG-TERM ENERGY PLAN: BUILDING OUR CLEAN ENERGY FUTURE

Ontario has made significant progress on the items outlined in an energy plan put forward in 2007 — including moving towards the planned elimination of coal by the end of 2014, and significantly increasing our renewable energy supply and conservation efforts. Changing technologies and a changing economy required an update to such planning. In November 2010, the government put forward Ontario's Long-Term Energy Plan. This 20-year plan identifies the essential investments needed to keep the lights on in our homes, businesses, schools and hospitals. The plan calls for a balanced mix of clean power sources and the end to using dirty, smog-producing coal. The plan also includes modernizing our nuclear facilities in order to ensure a continued supply of clean, reliable power to meet our base-load needs. It will also ensure continued upgrades to our transmission lines, as well as a supply of new ones in order to deliver new clean power to our homes, and businesses. It sets the course for a clean energy revolution in Ontario that will create thousands of new, good jobs and improve our air quality.



Conservation highlights

Ontario's progress in lowering emissions is also due to the many Ontarians who participated in conservation programs.

The Ontario Power Authority also offered energy conservation incentives to consumers and businesses. Programs offered by the Ontario Power Authority include the *saveONenergy* fridge and freezer pickup and heating and cooling incentive, *peaksaver* and a range of programs targeted at commercial, institutional and industrial customers.

In order to reach more consumers and communities, Ontario also put in place strategies to help low-income energy users. In July 2010, the Minister of Energy directed the Ontario Power Authority

In 2009 natural gas conservation programs lowered GHG emissions by

314,000 tonnes

and the Ontario Energy Board to develop programs for low income residential energy consumers that would start in early 2011.

Ontario's natural gas distributors also offered conservation incentives to residential, commercial and industrial customers, as well as to low income consumers. Programs, operating since 1995, have been responsible for reducing GHGs. In 2009 natural gas conservation programs lowered GHG emissions by 314,000 tonnes.

The Exhibition Place photovoltaic array was the largest in Canada at the time of installation. Toronto Atmospheric Fund (TAF) is now sharing lessons from this project and other large urban solar installations through its SolarCity Partnership program.
Photo: Carmanagh Technologies Inc.

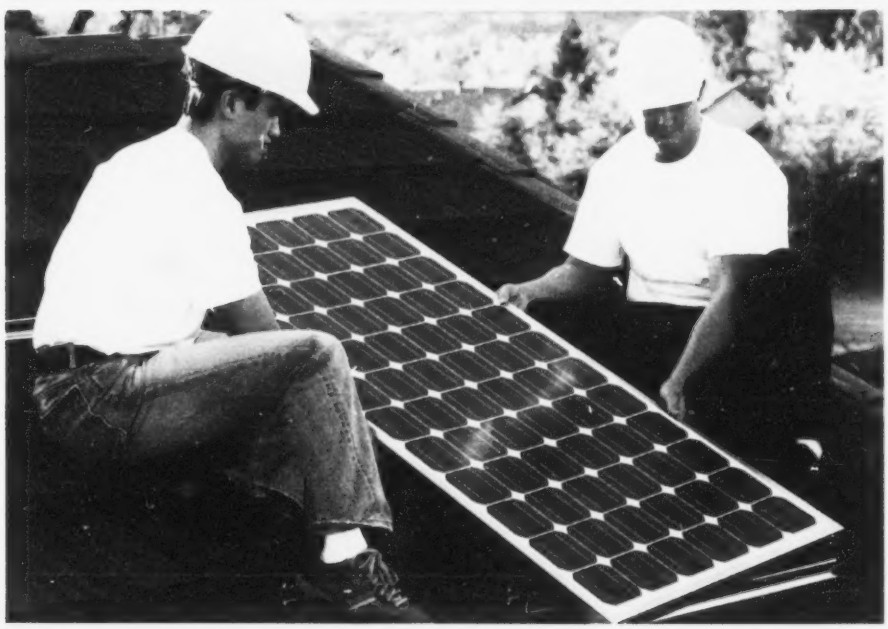
CLEAN ENERGY EXAMPLES IN ONTARIO

1

We have negotiated the Green Energy Investment Agreement with a consortium that includes **Samsung C&T Corporation** and the **Korea Electric Power Corporation**. This consortium is investing $7 billion on renewable energy in the province. This, in turn, will lead to both energy generation and manufacturing facilities being constructed in Ontario for the development of 2,500 MW of wind and solar power. These projects will provide enough clean electricity to power more than 580,000 households.

The investment will also lead to more than 16,000 new 'green collar' energy jobs to build, install and operate the renewable generation projects.

Siemens announced that it will build Ontario's first wind turbine blade manufacturing plant, a project which will create up to 900 direct and indirect jobs. This is part of the Green Energy Investment Agreement that will bring four manufacturing facilities to Ontario.



2

CS Wind has chosen to locate its wind tower manufacturing plant in Windsor, which will bring 300 new full-time jobs and up to 400 construction and indirect service jobs. This plant is part of a $7-billion investment by Samsung and its partners, the largest single investment in renewable energy in provincial history.

3

In October 2009, ATS announced plans to establish **Photowatt Ontario** at its Cambridge site. Photowatt is now producing solar modules on its 100 MW line.

4

In 2010, **Canadian Solar Inc.** announced it would build its first solar module manufacturing facility in Ontario. The site, located in Guelph, serves Ontario's growing clean energy industry and created up to 500 jobs.

OUR **NEXT STEPS**

- **Use the energy efficiency provisions contained in the Green Energy Act, 2009 to propose important new standards, including:**

  - **Enhanced efficiency measures for lighting** — which would put an end to inefficient lighting, wherever other options are available, and meet Ontario's commitment to eliminate inefficient lighting by 2012
  - **Minimum energy efficiency levels for certain new products and appliances** that are not yet regulated, e.g., commercial gas water heaters and boilers, windows, commercial clothes washers, wine chillers
  - **Enhanced energy efficiency standards for products** already regulated such as gas furnaces, food service refrigerators, freezers, dehumidifiers, gas clothes dryers, exit signs, gas pool heaters, water chillers, through-the-wall and single packaged central air conditioners.

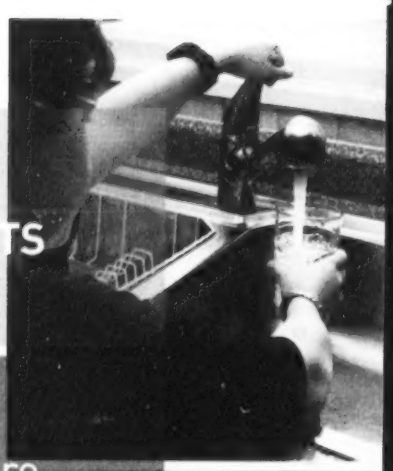
- **Integrate natural gas and electricity conservation programs.** We are building partnerships with electricity and natural gas distributors to coordinate and enhance conservation programs.

- **Launch a new suite of enhanced electricity conservation programs.** The OPA and Ontario's electricity distributors now offer a range of conservation programs to home owners and commercial, institutional and industrial customers.

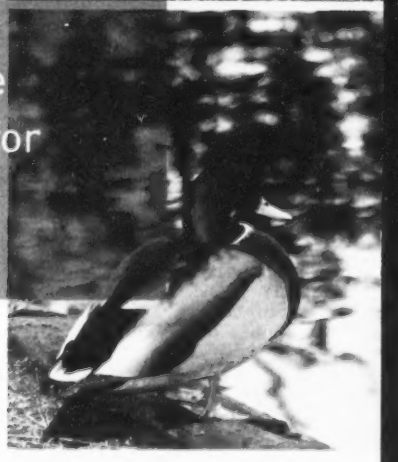
- **Improve conservation measures in the new edition of the Building Code.** Enhanced requirements for energy conservation measures in new construction are already scheduled to come into force in 2012. Consultations are underway to consider requirements that would take energy and water efficiency to higher levels beyond 2012. Recommendations from the Building Code Energy Advisory Council and other stakeholders are considered by government when determining what those new energy requirements will be.

- **Continue to find ways to encourage new technology development, promote greater use of lower polluting fuels and foster manufacturing process improvements.**

CONSERVING OUR WATER, LANDS AND FORESTS



We are taking action now to create a greener future for Ontario. We see a province where there is enough clean drinking water for everyone... where we maintain rich agricultural lands to grow healthy food... and where we value, conserve and enhance the resiliency of our wetlands, forests and northern regions to a changing climate. In turn, these natural spaces can help moderate our temperatures, reduce the effects of storms, conserve soil and clean the air we breathe and the water we drink. We are working to preserve this unique legacy for all to enjoy today — and for generations yet to come.



Climate change is expected to result in extreme and unpredictable weather patterns world-wide. The report by Ontario's Expert Panel on Climate Change Adaptation states that, for Ontario, "more moisture in a warmer atmosphere is expected to cause an increase in extreme weather events — rain, snow, drought, heat waves, wind and ice storms… Weather is also likely to be more variable and less predictable year to year."

Ontarians will be directly affected by increased temperatures and extreme weather events; we need to be prepared for these impacts which will affect many aspects of our day-to-day lives. Changes we can expect include:

- An increase in the number of heat wave days in the summer
- Failure of our infrastructure to withstand severe weather episodes, e.g., extreme precipitation
- An increased risk to health from West Nile Virus and Lyme disease
- A potentially longer growing season combined with probable water shortages.

As we act to sustainably manage and conserve our water, land and forests, we can respond to the impacts of climate change in two different ways:

1 **We can reduce — or mitigate — the impact** by slowing the release of GHG emissions into the atmosphere

2 **We can strengthen our ability to adapt** to a changing climate.

For example, in times of drought the need to conserve water is more urgent. We may take shorter showers, or use less water to wash dishes and clothes. When we do these things, we are adapting to climate change. Reducing water usage also helps with reducing — or 'mitigating' — greenhouse gas emissions. That's because we will lower the GHG emissions that come from transporting water from our public water systems to our taps and then heating it.

WHAT IS ADAPTATION?

Adaptation is the process societies go through in order to cope with an uncertain future. Adapting to climate change entails taking measures to reduce the negative effects of climate change — or take advantage of the positive effects. For example, faced with greater storm activity, we may change the way we design and build our roads, bridges and buildings to better withstand these weather events.

PROTECTING **OUR WATER**

We know that the impacts of climate change on the quality and quantity of the world's water resources are fast becoming a critical global issue. Already, close to half of the world's population — about 46 per cent — do not have running water in their homes. In the next 15 years, 1.8 billion people will live in regions where water scarcity is a reality.[3]

With its strong measures to protect and conserve water, Ontario is a North American leader in clean water. Our policies and programs rest on a strong legislative framework that includes:

- The Clean Water Act, 2006. This legislation has made our drinking water some of the best-protected and highest quality in North America. It protects our drinking water from source to tap and promotes watershed planning. To date, the province has invested over $210 million to fund two important areas of drinking water protection. One is conducting research to better understand our water resources; the other is giving grants to landowners, under the Ontario Drinking Water Stewardship Program, to remove risks to municipal drinking water sources.
- The Lake Simcoe Protection Act, 2008. This legislation is helping to protect and restore the ecological health of the lake and watershed.
- The Ontario Water Resources Act, which bans water diversions out of Ontario's three major water basins, including the Great Lakes — St. Lawrence River Basin, Hudson Bay Basin and the Nelson Basin.

Our recent actions to protect and conserve Ontario's water include:

- **We introduced new water legislation:** The Water Opportunities Act, 2010 sets a framework to help make Ontario the North American leader in the development and sale of clean water technologies and services. The act will also help Ontarians use water more wisely and sustain Ontario's water infrastructure. This is one of the goals of the Open Ontario Plan.[4] The plan is designed to create new opportunities for jobs and growth over the next five years.
- **We are working with our partners to restore areas of concern around the Great Lakes.** Scientists from Canada and Ontario are working together as a result of the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA) and other cooperative arrangements to better understand the potential effects of climate change on the Great Lakes Basin ecosystem. Scientists will be looking at possible impacts to water levels, to the health and abundance of fish and wildlife, and on human health and our economy.

3 United Nations World Water Assessment Programme, *Water, A Shared Responsibility: UN World Water Development Report 2* (New York: United Nations Educational, Scientific and Cultural Organization, 2006).

4 Ontario Office of the Premier, *Open Ontario — A Five-Year Plan for Our Economy*, 15 Feb 2011 ontario.ca/openontario

- **Since 2003, the province has committed approximately $1.8 billion in funding for municipal water and wastewater infrastructure** through grant programs and almost $1.7 billion in affordable loans through Infrastructure Ontario. We also committed $36 million for 60 new water and wastewater inspectors and resources.

The next step is increased conservation. **Water-related services account for about 40 per cent of our natural gas usage and 12 per cent of our electricity usage in Ontario.**[5]

LANDS AND FORESTS **STEWARDSHIP**

Sustainably managing and conserving our forests and natural areas will help us lessen and adapt to the effects of climate change.

Forests help buffer our ecosystems from the impacts of climate change. Trees moderate the local climate by providing shade, reducing the effects of storms, and increasing soil and water retention. Trees provide habitat for wildlife. Trees, forests and peat lands also act as storage houses for carbon that would otherwise be released into the atmosphere.

Our natural lands and forests are an important part of everyday life for many people in Ontario. The hands-on lessons we learn by working with local communities can be applied across our province and around the world. In fact, Ontario is well positioned for global leadership in sustainable forest management. In the words of the Environmental Commissioner of Ontario:

> The extent of (global) deforestation is something that can be reversed to some degree over the coming decades by reforestation on a widespread scale… Ontario also has considerable expertise in this field that could be put to good use in international initiatives toward global reforestation.[6]

The province is considering participating in a United Nations program that helps regions in developing countries deal with climate change, utilizing mitigation and adaptation strategies.

DID YOU KNOW?

Ontario is blessed with a forested area that is nearly 50 per cent larger than France. Over 90 per cent of that forested land is publicly owned.

5 Maas Carol, *Ontario's Water-Energy Nexus: Will We Find Ourselves in Hot Water… or Tap into Opportunity?* (Vancouver: POLIS Project on Ecological Governance, 2010).

6 Environmental Commissioner of Ontario, *Broadening Ontario's Climate Change Policy Agenda: Annual Greenhouse Gas Progress Report 2010* (Toronto: Environmental Commissioner of Ontario, 2010) 11.

Our recent actions to protect Ontario lands and forests include:

- **The Legislature passed the Far North Act, 2010**. This legislation enables community-based land use planning. The act includes an objective to protect at least 225,000 square kilometres of northern boreal forest and peat lands in an interconnected network of protected areas designated in community based land use plans. Ontario is also providing funding for First Nation communities in the Far North to develop sustainable land use plans. The total funding committed to support land use planning in the Far North is $46 million.
- **We committed to planting 50 million more trees** by 2020 as part of the United Nations Billion Tree Campaign program. Working with conservation authorities, forestry consultants, local land owners, municipalities, we have planted almost six million trees to date under a plan to reforest marginal agricultural lands in Southern Ontario.
- **We are implementing the Growth Plan** for the Greater Golden Horseshoe under the Places to Grow Act, 2005. This plan, along with the Greenbelt Plan, will permanently protect green spaces, sensitive areas and agricultural lands. At the same time, it will help Ontario manage the pressures of urban growth in a sustainable manner.

Our next steps

- **Proceed with a comprehensive adaptation plan — Climate Ready: Ontario's Adaptation Strategy and Action Plan 2011-2014.** This plan will build on the recommendations of Ontario's Expert Panel on Climate Change Adaptation. It will:
  - Enhance our work to sustain our natural resources, the forestry and the agricultural sectors and protect them from the negative impacts of climate change
  - Support community-based adaptation plans
  - Encourage adaptation to be part of infrastructure, public health and planning decisions.

  To learn more about Climate Ready: Ontario's Adaptation Strategy and Action Plan 2011-2014, go to: ontario.ca/climatechange
- As part of Ontario's commitment to international action on climate change, Ontario will continue working with the United Nations Development Program (UNDP) under its Territorial Approach to Climate Change Program. This program partners developed sub-national governments with counterparts in developing countries to address climate change. Ontario's Minister of the Environment signed a Statement of Intent with the UNDP at the United Nations Framework Convention on Climate Change Conference of the Parties (COP15) in December 2009.
- Update Ontario's Forest Resource Inventory. This will allow the province to better assess the climate impacts and carbon storage potential of our managed forests.
- Continue developing an offsets program to provide economic incentives and job opportunities for forestry and agriculture projects in Northern and rural Ontario.

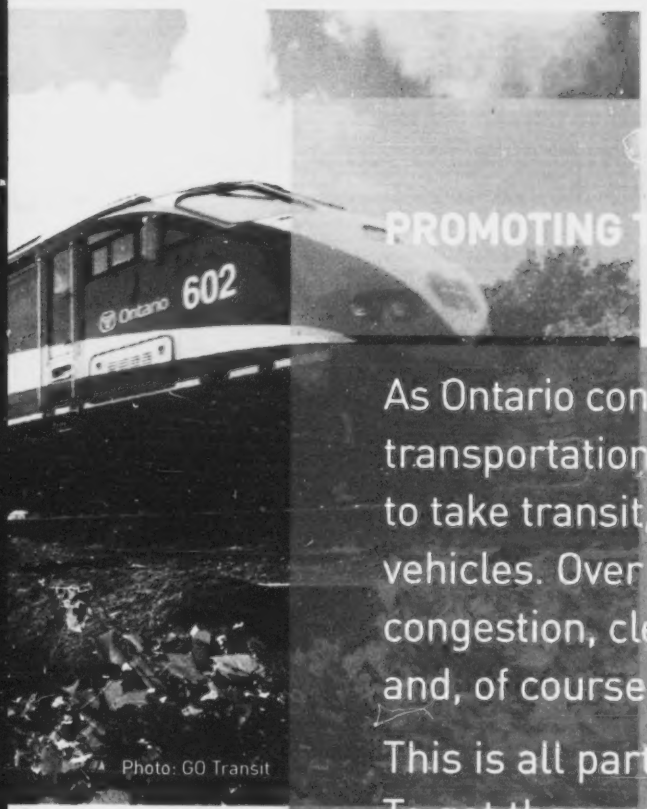
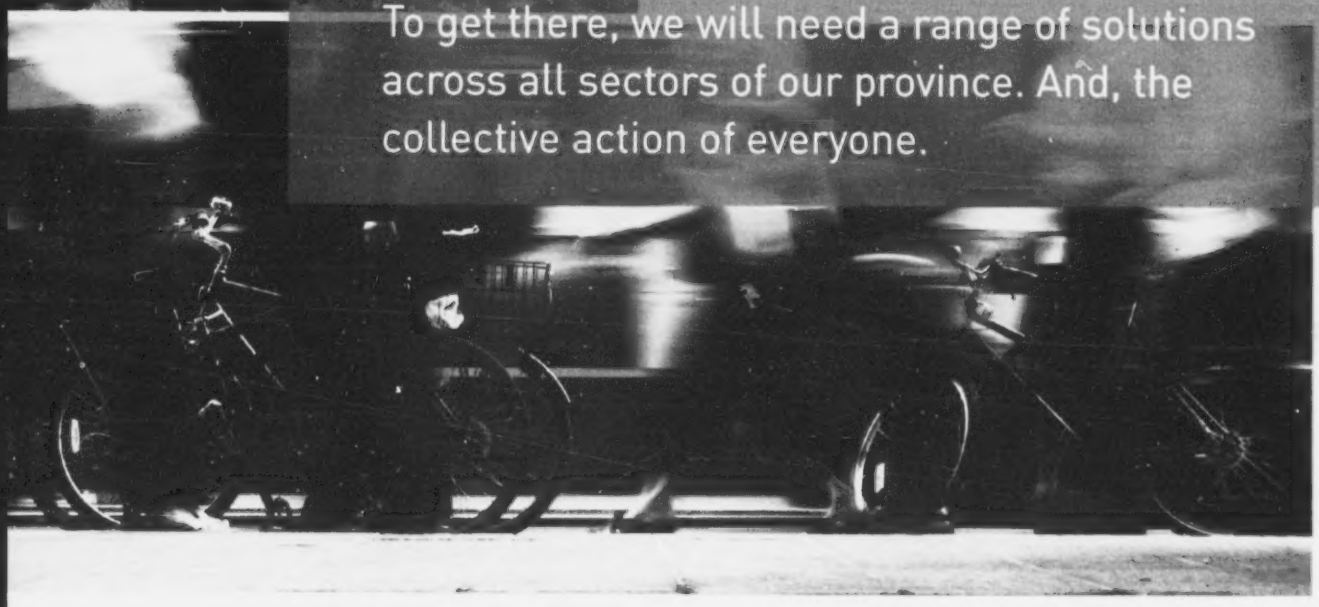


Photo: GO Transit

PROMOTING TRANSPORTATION EFFICIENCY

As Ontario continues to develop a more sustainable transportation system, more people will be able to take transit, cycle, walk or drive more efficient vehicles. Over time, it will mean less traffic congestion, cleaner air, healthier communities — and, of course, fewer GHG emissions.

This is all part of what Ontario's future holds. To get there, we will need a range of solutions across all sectors of our province. And, the collective action of everyone.



Ontario has made record investments in public transit in the past decade. These investments have made it easier for people to manage without a car or to leave their cars at home. There are economic benefits as well.

We have committed:

- More than $9 billion to Metrolinx's priority rapid transit projects. These projects are expected to create over 95,500 jobs
- $600 million to a Light Rapid Transit (LRT) project for the City of Ottawa. This project is expected to result in 20,000 person years of employment. The city also predicts the LRT project will reduce emissions of carbon dioxide by approximately 38,000 tonnes per year by 2031. That's like taking 7,300 cars off our streets
- $300 million towards Waterloo Region rapid transit to improve transit in the Region. Improvements will better connect the cities of Kitchener, Waterloo and Cambridge and GO Transit services. The Region expects the project to result in a reduction of GHG emission of up to 22,000 tonnes per year by 2031.

Further, the Air Rail Link between Toronto Union Station and Pearson International Airport will take 1.2 million car-trips off our roads in its first year of operation. An environmental assessment to electrify the Air Rail Link will proceed.

Despite these and other clean transportation initiatives, the challenges ahead are many and complex. We know that:

- Cars and trucks are a growing source of GHG emissions in Ontario and throughout North America. Ontario spends $15 billion or more on imported gasoline, diesel and oil each year
- Our estimated economic losses from traffic congestion each year in the Greater Toronto and Hamilton area alone total an estimated $6 billion[7]
- Over the next two decades the number of vehicles is projected to increase 35 per cent in the Greater Toronto and Hamilton area alone.

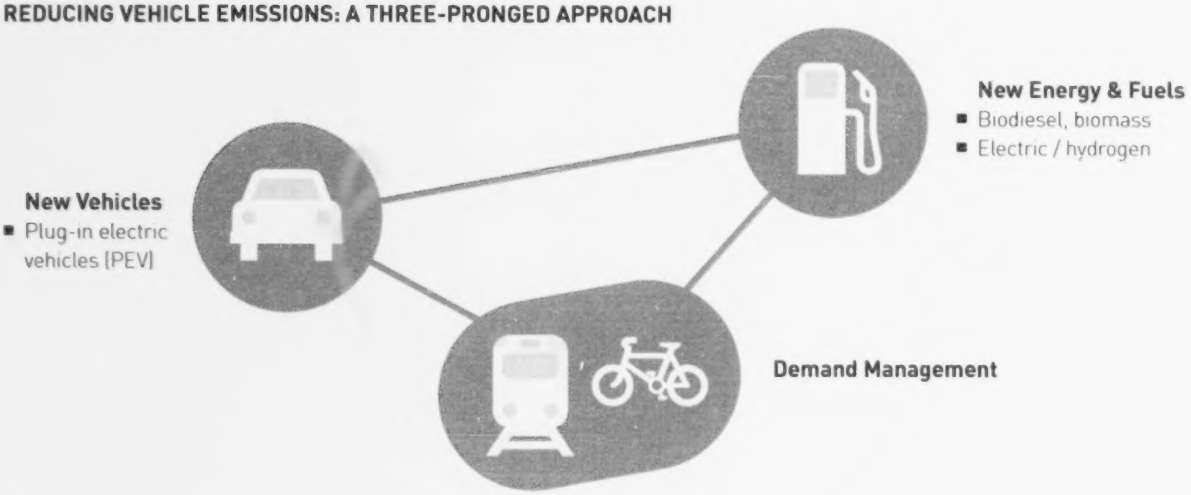
7 HDR Corporation Decision Economics, *Cost of Road Congestion in the Greater Toronto and Hamilton Area: Impact and Cost Benefit Analysis of the Metrolinx Draft Regional Transportation Plan* (Toronto: Greater Toronto Transportation Authority, 2008) A7-1.

DRIVING **CHANGE**

As Figure 4 below shows, we can reduce emissions from transportation by focusing on three areas:

1. Improving the fuel efficiency of the vehicle — for example, with hybrid vehicles
2. Reducing the carbon content of the fuel — for example, with biofuels
3. Changing behaviour — for example, with increased use of transit, slower driving speeds, less idling and so on.

FIGURE 4.
REDUCING VEHICLE EMISSIONS: A THREE-PRONGED APPROACH



Our current system was developed over the course of several decades, so progress in each of these areas will take time. It takes time for new vehicle technologies to take hold in the market because modern vehicles tend to last much longer. It will also take time to transition to sustainable fuel alternatives.

However, we know that every time we choose to take transit, cycle, walk, or drive a more efficient vehicle, we reduce smog and harmful GHG emissions. We also reduce the amount of fossil fuels we import into the Ontario economy.

OUR PROGRESS **SO FAR**

The province continues to invest in initiatives that will help change behaviour. Our Growth Plan for the Greater Golden Horseshoe, under the Places to Grow Act, 2005, is designed to support greater density and transit alternatives. These will help limit growing traffic congestion and urban sprawl.

Ontario has also invested more than $10.8 billion in public transit since 2003. This includes some $4.7 billion invested in GO Transit in the Greater Toronto Area. In addition, Ontario has committed over $9 billion to regional rapid transit projects in Toronto and York Region.

In addition, we have launched a number of new programs to help communities adopt clean transportation alternatives. These programs include:

- The Transportation Demand Management Grant Program. This program helps communities to reduce auto trips and use other forms of transportation. Ontario has invested $750,000 to date on 34 projects.
- The Gas Tax Program. With this program, we have delivered on our commitment to provide municipalities a source of long-term, sustainable funding for public transit. The program provides two cents per litre of provincial gas tax revenues to municipalities to fund public transit. Since 2004, we have committed over $1.6 billion in funding through this program.
- The Electric Vehicle Incentive Program. This program provides an ambitious incentive of up to $8,500 for the purchase or lease of a new plug-in electric vehicle. This is one of the most generous electric vehicle purchase incentives in North America.
- The Green Commercial Vehicle Program awarded $5.5 million in grants and helped companies to purchase alternative fuel vehicles and to retrofit heavy duty vehicles with anti-idling technologies. As a result of the program:

273 hybrid electric vehicles were deployed

4 plug-in electric vehicles were deployed

18 alternative fuel vehicles were deployed; a further **250** alternative fuel vehicles will be deployed shortly

HOW GREEN ARE ONTARIO'S COMMUNITIES?

Communities across the province are finding ways to cut emissions related to transportation options. The Community Go Green Fund has supported 90 innovative community projects, of which 10 focused on reducing emissions from vehicles. These include:

- **Bike Train** in the Muskoka Region
- **iCANwalk** project which has already reduced 16 tonnes of GHG emissions through its walkability pledges
- the **Driving Force** project in Cornwall. This program educated vehicle owners on proper maintenance and driving techniques, with the goal to reduce GHG emissions by 425 tonnes.

Photo: R & E Mapili

OUR **NEXT STEPS**

- The Premier's Climate Change Advisory Panel will provide advice on a vision of a cleaner, more efficient transportation system for Ontario.
- We will continue to support the adoption of electric vehicles. This includes:
  - Incentives of $5,000 to $8,500 based on battery capacity for the purchase or lease of a new Plug-In Electric Vehicle
  - Green licence plates granting access to HOV lanes, for a limited time, no matter how many people are in the vehicle
  - Access to future recharging stations at select Provincial Government and GO Transit parking sites.
- We are gathering more public input on future land use patterns. We want to promote a mix of housing, employment, parks and open spaces and transportation choices. Our goal is to facilitate walking, biking, transit and other modes of travel through the Provincial Policy Statement review.

Section 2

WORKING TOGETHER — ONTARIO'S PARTNERS

Ontario's future will be the creation of everyone working together to find innovative solutions to the challenges of climate change. We are on the right track. But the challenges ahead are significant. We need to move forward in a way that will be good not just in the short term, but for decades to come. We can all take action to help the province grow in a sustainable way that promotes a healthy economy and healthy communities.

Ontario is contributing some of the largest emission reductions towards Canada's international climate change targets, most notably, through our leadership to phase out coal-fired generation. Ontario would welcome a stronger partnership with the federal government as we work together to meet our provincial and national climate goals.

However, our progress is not due solely to the actions taken by the Ontario government. Municipalities, businesses, communities, schools and individuals are all making a difference. There are examples everywhere of Ontarians working to build a cleaner future for Ontario.

Over the past 27 years, for example, Ontario families have adopted recycling as part of their daily lives. Today, 4.9 million households in the province recycle. Since 2003, Ontario has doubled the amount of organic waste diverted from landfills.

In this section, you'll find more examples of the ways the government and its green partners are working to build a greener Ontario. These partners include community, educational and business organizations in every part of the province.

MUNICIPALITIES **AND LOCAL COMMUNITIES**

- Partners for Climate Protection. Almost 50 municipalities have joined this program so far. They are committed to quantify, reduce and report their GHG emissions.
- Live Green Toronto program. This program is key to the city's efforts to reduce GHG emissions by 80 per cent by 2050. It includes initiatives in water conservation, tree planting, energy efficiency, renewable energy, local food production and green roofs.
- Toronto Atmospheric Fund. An agency of the City of Toronto, the fund is leading innovative programs in energy conservation and neighbourhood solar power. Its FleetWise initiative aims to get at least 300 electric vehicles on the road by 2012.
- Partners in Project Green. Two partners have launched a Pearson Eco-Business Zone: the Toronto Region Conservation Authority and the Greater Toronto Airports Authority. Their project aims to improve the financial and environmental performance of businesses in the zone.

Toronto Atmospheric Fund's Solar Neighbourhoods program helped homeowners install solar water heating systems.
Photo: Ben Marans

Partners in Project Green
The Pearson Eco-Business Zone — an aerial view of Toronto Pearson International Airport and the surrounding business community.

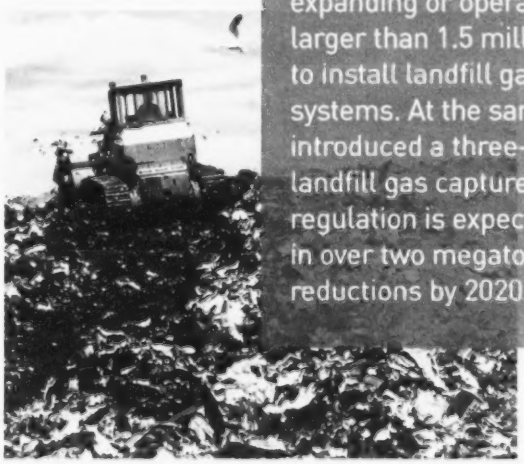
- Town of Markham. The town received the 2009 Federal Gas Tax Award from the Association of Municipalities of Ontario. The award recognizes the town's district energy system that links all buildings in Markham Centre. When complete, the system will reduce CO_2 emissions by 99,236 tonnes — half of the town's yearly total.

- City of Guelph's Community Energy Plan. While Guelph expects to be home to 65,000 more people over the next 25 years, the City aims to use less energy in 2035 than it does today.

Guelph public transportation

CAN GARBAGE BE GREEN?

In Ontario, the answer is 'yes.' In 2008, the province made changes to Ontario's landfill gas regulations. These changes require all new, expanding or operating landfills larger than 1.5 million cubic metres to install landfill gas collections systems. At the same time, we introduced a three-year $10 million landfill gas capture program. The regulation is expected to result in over two megatonnes of GHG reductions by 2020.



SCHOOLS, **COLLEGES AND UNIVERSITIES**

In 2009, Ontario announced $50 million in funding for school boards to install renewable energy technologies at school board facilities for heating, cooling or generating electricity. The province has also pledged $400 million to support the Energy Efficient Schools program.

Other initiatives include:

- Green Schools Pilot Initiative. This program is investing more than $20 million to pilot new green products and technologies in over 150 Ontario schools and 40 school boards. This investment will help local businesses showcase their innovations while supporting a greener economy.
- Ontario Universities: Committed to a Greener World. The Council of Ontario Universities has developed a sustainability pledge. The pledge commits Ontario universities to:
  - Help find solutions to meet the challenges of environmental sustainability
  - Share knowledge about sustainability and climate change
  - Incorporate principles of sustainability into their own operations.

WHAT MAKES A SCHOOL GREEN?

The Toronto District School Board has adopted a 10-point action plan to make it more environmentally sustainable. The strategy includes plans to build solar rooftop panels at 20 schools each year. It also sets a goal to reduce GHGs by 20 per cent by 2020. The Board will achieve these targets by making school retrofits and reducing garbage pick up to once a week.

BUSINESS AND INDUSTRY
(COMMERCIAL BUILDINGS AND MANUFACTURING)

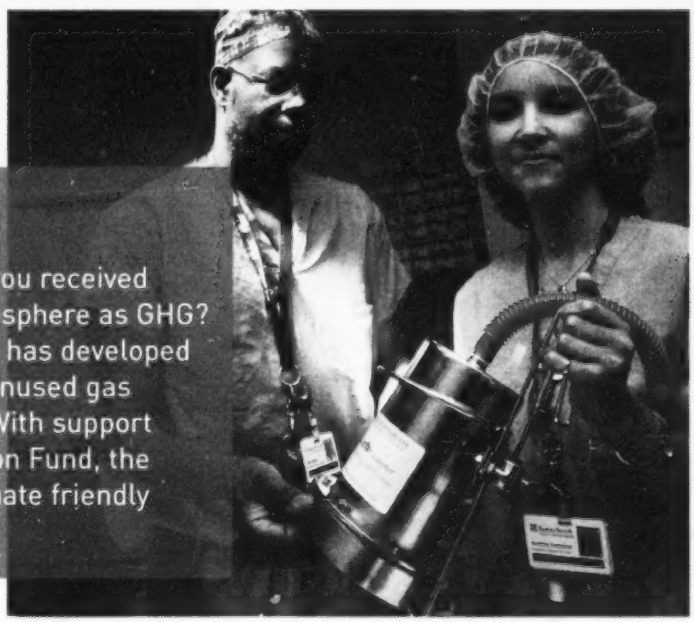
Through its Innovation Agenda, Ontario will invest millions of dollars in a range of programs to help business and industry go green.

These include:

- Ontario Power Authority Industrial Accelerator. This program will pay up to 70 per cent toward the cost of a major energy efficiency project. A maximum of $10 million applies. In return, companies will commit to achieve and maintain specific conservation targets within a set period of time.
- Reducing GHG emissions from Commercial Buildings. The Real Property Association of Canada is working with commercial buildings to reduce GHG emissions. The target is to reduce a building's energy consumption by 20 equivalent kilowatt-hours of total energy use per square foot of building area per year. It is one of the most aggressive office building energy performance targets in the world.
- The Green Focus on Innovation and Technology (FIT) program. Through GreenFIT, the Dorion Fish Culture Station has made a number of upgrades. These include replacing oil-fired heating equipment with a new geothermal heating system. This move has replaced 32,000 litres of fossil fuel consumption.
- The Innovation Demonstration Fund. Ontario is investing $4 million through the Fund to help **Woodland Biofuels Inc.** and its partners build a groundbreaking demonstration plant. This plant will efficiently produce biofuel from renewable wastes without generating toxic emissions.

INNOVATION IN OUR HOSPITALS

Did you know some of the anaesthetic gas you received during a surgery once ended up in the atmosphere as GHG? Not any more. Blue-Zone Technologies Ltd. has developed a system which captures and recycles the unused gas before it is released into the environment. With support from Ontario's Innovation and Demonstration Fund, the company is set to bring this innovative, climate friendly technology to hospitals around the world.



AGRICULTURE **AND FORESTRY**

Changes or variations in climate have the potential to affect the global food supply.

The sustainability of food production systems and the prospect of a low carbon economy are being tested as never before. Ontario boasts one of the most diverse agricultural sectors in Canada. Ontario's agricultural sector will play an active role in addressing the challenges ahead. The sector will make a positive contribution by:

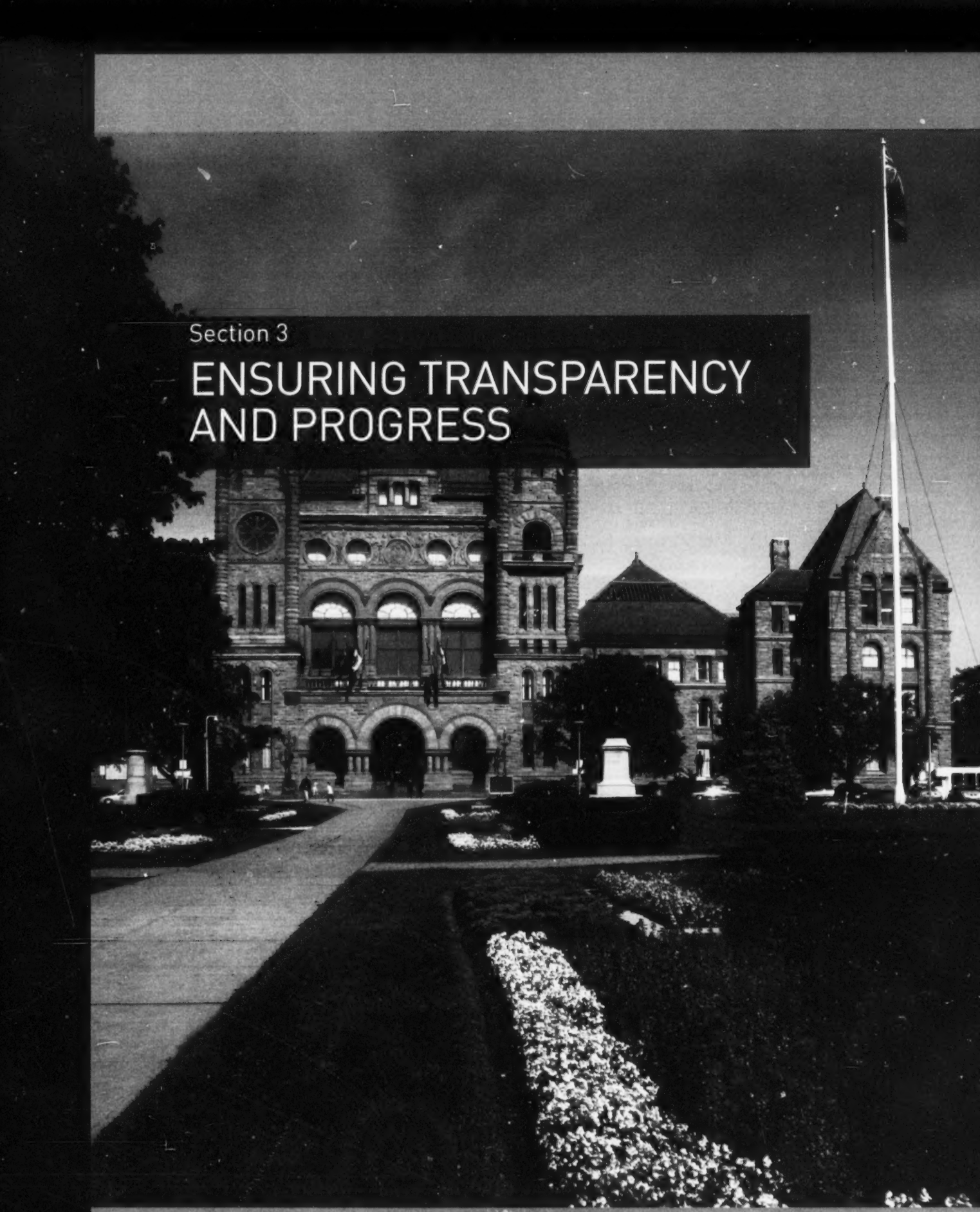
- Reducing greenhouse gas emissions
- Adapting to climate change
- Increasing food production in a sustainable manner.

Examples include:

- Ontario Biogas Financial Assistance Program: This $11.2M program supported the construction of 27 on-farm biogas systems including one food processing biogas system. These systems will provide almost 12 MW of power and significant heat production while delivering other environmental benefits beyond methane capture. This program stimulated a new biogas sector, helping create or expand a number of biogas-related companies in Ontario.
- Government continues to make Ontarians aware of the high-quality foods grown and produced here through advertising done by **Foodland Ontario**. Messages encourage consumers to 'choose Ontario foods first' in grocery stores, farmers' markets and restaurants across the province.

Likewise, the province's forestry industry is working with the Ontario government to be part of the solution. The province is a recognized world leader in its forest programs and practices. Our forest industry continues to evolve and to embrace emerging bio-economy and clean technologies.

One innovative business is happening in Ingleside. The Canadian Bio Pellet's facility is scheduled to open in 2011. This operation will turn wood chips, sawdust and shavings into biomass wood pellets for heating and electricity generation. The company is expected to create about 90 jobs and add about $60 million yearly to the local and regional economy.



Section 3

ENSURING TRANSPARENCY AND PROGRESS

A FRAMEWORK **TO ENSURE CONTINUED PROGRESS**

Ontario government ministries report directly to the newly formed Climate Change Results Table. This table tracks the results of individual initiatives under Ontario's Climate Change Action Plan. It is chaired by the Minister of the Environment. Members include the ministers of departments that have a role in policy or programming for sectors such as transportation, energy, industry and innovative new technologies.

A designated team within Cabinet Office coordinates the work of the Climate Change Results Table as well as modelling and tracking of climate initiatives in general.

Climate change considerations are also incorporated into the business of government through ministry-level decision-making processes and the Ontario Public Service Green Office.

In addition, the Premier's Climate Change Advisory Panel provides advice on clean economy initiatives and emission reductions opportunities.

HOW DOES ONTARIO MAKE GREENER POLICY DECISIONS?

Climate change is incorporated into many ministry decisions. Examples include:

- Integrating considerations around climate change into water source protection planning
- Incorporating considerations around expected impacts from climate change into Great Lakes agreements and the Lake Simcoe Adaptation Strategy under the Lake Simcoe Protection Plan
- Integrating considerations around climate change into environmental assessment processes
- Incorporating expected impacts from climate change into air quality assessments
- Developing a web-based climate change weather and water information gateway for local decision makers as part of the Regional Adaptation Collaborative
- Incorporating considerations around climate change into existing guidelines and technical documents where appropriate
- Considering resiliency issues and energy efficiency in developing a new edition of Ontario's Building Code
- Revising the Management Board of Cabinet Procurement Directive to require ministries to make environmental, social, and economic considerations in their procurement planning and award decision-making processes
- Incorporating climate change into planning processes under the Places to Grow Act, 2005, and the Provincial Policy Statement Review.

A FRAMEWORK **FOR GREEN GOVERNMENT**

In 2010, Mediacorp Canada named the Ontario Public Service (OPS) one of Canada's Greenest Employers.[8] The award comes just one year after the OPS committed to a Green Transformation Strategy. The goal: to reduce GHG emissions from the OPS by 19 per cent below 2006 levels by 2014. The target for 2020 is 27 per cent below 2006 levels.

The OPS Green Office works with ministries to:

- Reduce consumption
- Integrate environmental sustainability into all aspects of the business lifecycle — from acquisition to disposal
- Embed environmental responsibility in the day-to-day work of the OPS.

This year the Ministry of Transportation received an environmental recognition award from Environmental Commissioner Gord Miller, for turning Summer Beaver Remote Northern Airport into Canada's first airport powered entirely by renewable energy.

KEY GREEN INITIATIVES AT THE ONTARIO PUBLIC SERVICE

1. **Greener power management:** enabling computers to hibernate when not in use
2. **Greener printing:** reducing the number of print and imaging devices
3. **Greener transportation:** improving overall fuel efficiency and reducing emissions from the government fleet
4. **Greener meetings:** using virtual meeting options such as two-way video conferencing and web casting
5. **Greener business practices:** requiring each ministry to set and achieve green performance commitments related to their operations.

8 Mediacorp Canada Inc, *2010 Canada's Greenest Employers*, 2011 canadastop100.com/environmental/

CONCLUSION

Through the efforts of many, Ontario has made real progress towards reducing emissions. Our projected 2009 GHG emissions are near or below 1990 levels. We are making progress toward our 2014 targets. Yet much remains to be done.

We know that it will be difficult for any country to reach the 2020 emission reduction pledges set through the 2010 Copenhagen Accord. But this does not change the urgency of moving forward.

More and more, countries around the world are adopting ideas such as:

- Reducing reliance on coal
- Increasing support for renewable energy
- Increasing energy and water conservation
- Using market based approaches to limit emissions and encourage new technology
- Promoting low carbon transportation options
- Being better stewards of lands and forests.

We are already pursuing all of these strategies here in Ontario. We are taking action because, despite our size compared to many countries, to lead by example is the right thing to do.

We are on the right track. We have made progress in the areas of greatest challenge the world over. We have also identified next steps to achieve our goals in the years to come — both in the areas where we are leading and in the areas where we have more work to do.

One thing is clear: building a cleaner future will require the effort of every business, community and household in the province. Small actions, multiplied many times, are just as important as any single large-scale initiative. We must all work together to create a more sustainable future for all Ontarians.

In this report we have outlined the progress we have made and will continue to make toward our climate change goals. We know that the innovative capacity of Ontarians will continue, in the years to come, to make our vision of a green Ontario a reality.

Appendix 1

THE NUMBERS

INTRODUCTION

This section of the report provides details on the source of the province's greenhouse gas (GHG) emissions and changes in emission levels between 1990 and 2008. In addition, this section of the report also provides an update on the province's forecasted emission levels out to 2020 and the impact of policies toward the province's emission targets.

Photo: Ron Pare

How Ontario measures its GHG emissions

Ontario's definition of GHG emissions aligns with the definitions used to prepare Environment Canada's 2010 National Inventory Report on Greenhouse Gases and Sinks in Canada (NIR). Each year, Environment Canada submits its updated NIR to the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat. Historical GHG emissions in this annual report are taken from the latest NIR which covers the period from 1990 to 2008. Using this approach, Ontario's GHG emissions data capture all of the GHGs resulting from economic activities and personal consumption choices that take place in Ontario.

The source of Ontario's GHG emissions

Ontario's GHG emissions can be analyzed in a number of ways. Two of the most common approaches include:

- Measuring GHG emissions from different fossil fuel and non-fuel sources
- Measuring the emissions produced by different sectors of the economy

Using either approach, Ontario's 2008 emissions total 190 Mt CO_2 equivalent (eq).

Fuel source analysis focuses on the use of various types of fossil fuels that emit GHGs when burned, in addition to non-fuel GHG emissions from agriculture, waste and industrial processes/solvents. In 2008 three fossil fuels — coal, natural gas and refined petroleum products — were responsible for emitting more than 75 per cent of Ontario's GHGs.

Analyzing the GHG emissions that come from different sectors of the economy focuses on the contribution made by a broad range of activities. The government uses six key economic sectors to evaluate source-related GHG emissions, as shown in the Table 1, including: electricity, transportation, industry, buildings, agriculture and waste.

FIGURE 1.
2008 EMISSIONS BY SOURCE AND SECTOR

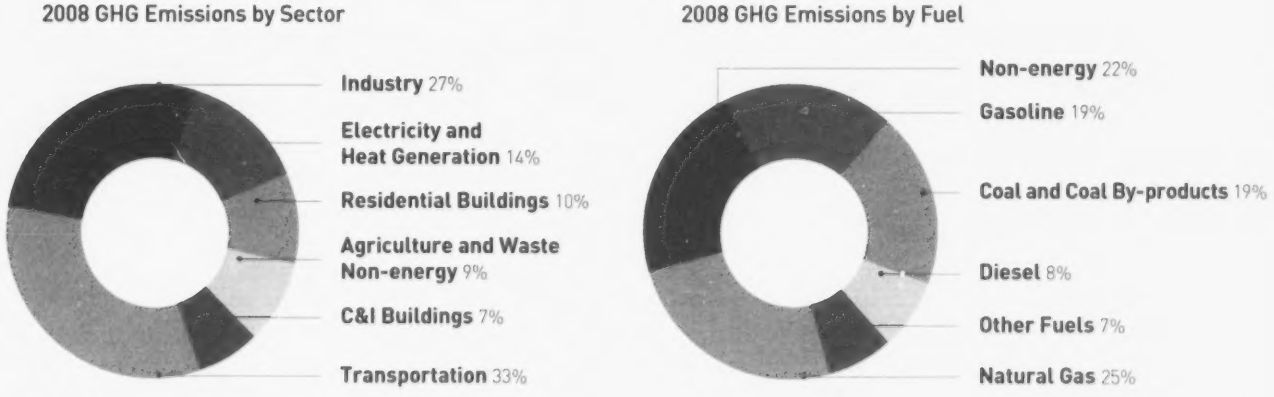


TABLE 1.
ONTARIO EMISSION SECTOR DESCRIPTIONS

Economic Sector	Description
Transportation	Emissions from the consumption of fossil fuels such as diesel, gasoline and propane consumed by passenger and commercial vehicles including road, rail, marine and air travel
Industry	Emissions from industrial processes and the use of fossil fuels such as coke, natural gas and coal are produced from a range of industries including mining, oil and gas extraction, manufacturing, mineral and chemical production, construction and paper and wood products production
Buildings	Emissions from the use of fossil fuels such as natural gas in residential, commercial and institutional buildings for heating and water
Electricity	Emissions from electricity and heat generation produced from the combustion of fossil fuels such as coal and natural gas
Agriculture	Emissions generated by enteric fermentatio' , manure management and fertilizer application
Waste	Emissions generated by solid waste disposal on land, wastewater handling and waste incineration

Long term trends in Ontario's emissions (1990-2008)

Between 1990 and 2008, Ontario's total annual GHG emissions rose by 8 per cent, from 176 Mt of CO_2 eq to 190 Mt of CO_2 eq. Figure 2 shows that while total emissions increased steadily in the first half of this period, more recent annual emission levels have fluctuated up and down in response to changes in the economy, the weather, energy demand and technological changes to industrial processes, transportation and consumer products.

In 2008, Canada's GHG emissions totalled 734 Mt CO_2 eq. That total represents an increase of 24 per cent since 1990 — about three times the rate of increase in Ontario. However, GHG emission increases since 1990 have also varied across Canada. Quebec's emissions decreased by 1 per cent while Saskatchewan realized the highest increase in emissions (73 per cent) (see Figure 3). In 2008, Ontario was Canada's second-largest producer of GHG emissions after Alberta.

FIGURE 2.
ONTARIO'S GHG EMISSIONS, 1990-2008

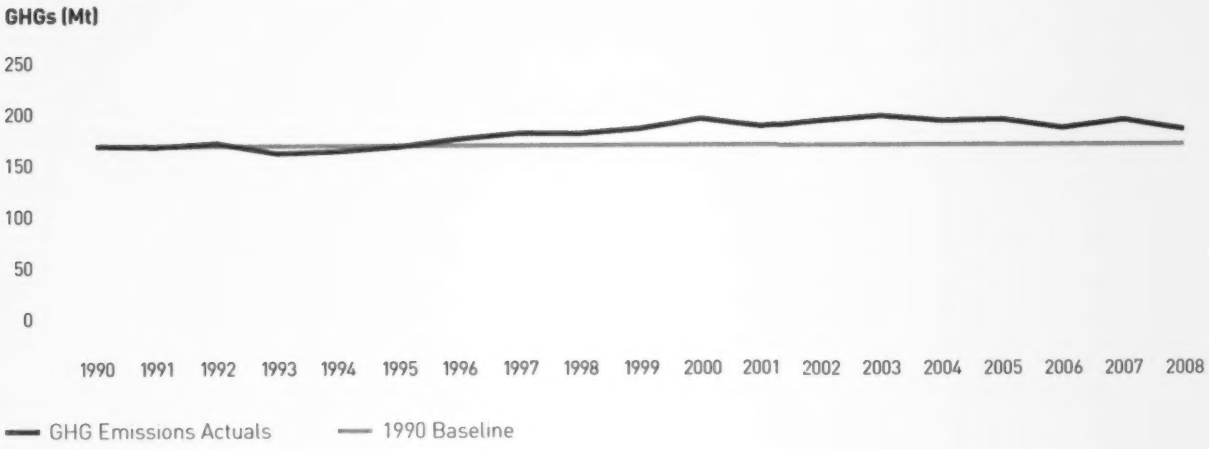
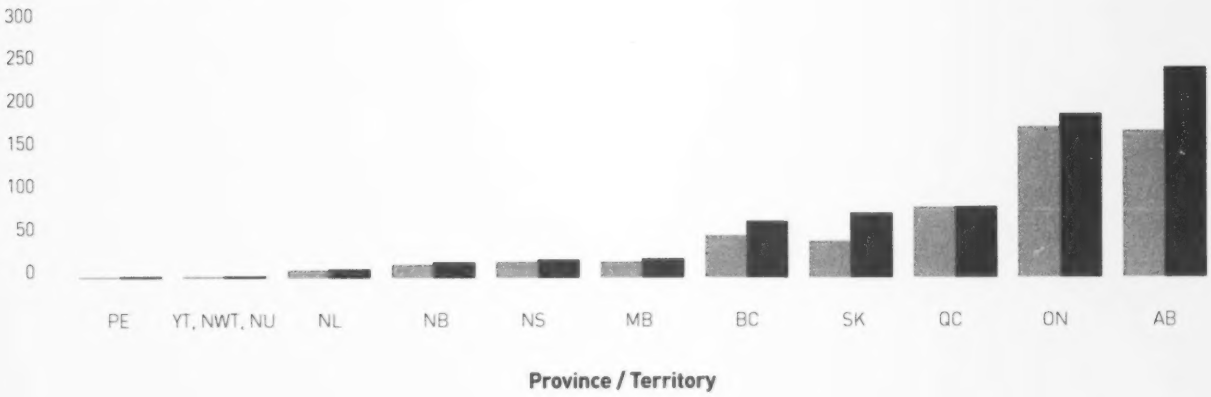


FIGURE 3.
TOTAL TERRITORIAL AND PROVINCIAL GHG EMISSIONS, 1990 AND 2008

National Inventory Report, 2010



The table below lists Ontario's emissions by sector, and describes some of the factors that influenced changes in emission levels between 1990 and 2008.

TABLE 2.
EMISSION CHANGES BY SECTOR

Transportation: 1990: 44.8 Mt 2008: 60.3 Mt % Change: 35%	Road transportation in Ontario was responsible for the greatest increase in emissions of all Ontario sectors between 1990 and 2008. Ontario's long-term road transportation emissions increase can be directly related to the 38 per cent growth in the on-road vehicle population, and the increasing consumer preference for SUVs, vans and pickups over smaller gasoline passenger vehicles. Higher long-term transportation emissions also reflect the increasing national trend towards just-in-time delivery.
Industry: 1990: 61.7 Mt 2008: 51.8 Mt % Change: -16%	The substantial reductions in emissions from the industrial sector can be attributed to the installation of a catalytic emission abatement system at Canada's only adipic acid production plant in 1997. It should be noted that the plant became indefinitely idled starting in the spring of 2009.
Buildings: 1990: 26.3 Mt 2008: 33.0 Mt % Change: 25%	Long-term increases in this sector are due to economic changes and population growth. Emissions from commercial and institutional buildings have increased by 45 per cent due to a shift in the provincial economy from a manufacturing base to a diversified service industry, including finance, insurance and real estate. Residential emissions increased by 15 per cent while the population increased by 26 per cent.
Electricity: 1990: 26.6 Mt 2008: 27.4 Mt % Change: 3%	Despite the long-term growth of emissions in Ontario's electricity and heat generation sector (a 20 per cent increase between 1990 and 2007), between 2007 and 2008, emissions in this sector decreased by 15 per cent or 4.7 Mt. The main reason for this decrease in emissions is the lower consumption of coal for electricity generation.
Agriculture: 1990: 10.7 Mt 2008: 10.3 Mt % Change: -4%	Ontario's emissions from agriculture have remained relatively constant with slight fluctuations. Emissions fluctuate as a result of changing tilling/nutrient management techniques and livestock levels.
Waste: 1990: 5.8 Mt 2008: 7.4 Mt % Change: 28%	Emissions from waste increased primarily due to an increase in solid waste disposal on land and a provincial waste diversion rate that was below the national average.

Source: Environment Canada's 2010 National Inventory Report estimates. Note that, for the purposes of Climate Action Plan modelling, pipeline emissions are included in the Industrial sector instead of the Transportation sector.

It is important to note that while Ontario's total emissions increased between 1990 and 2008, our GHG emissions per capita, as well as the quantity of GHG emissions for each dollar of real Gross Domestic Product (GDP), went down over the same period. See Figure 4 below.

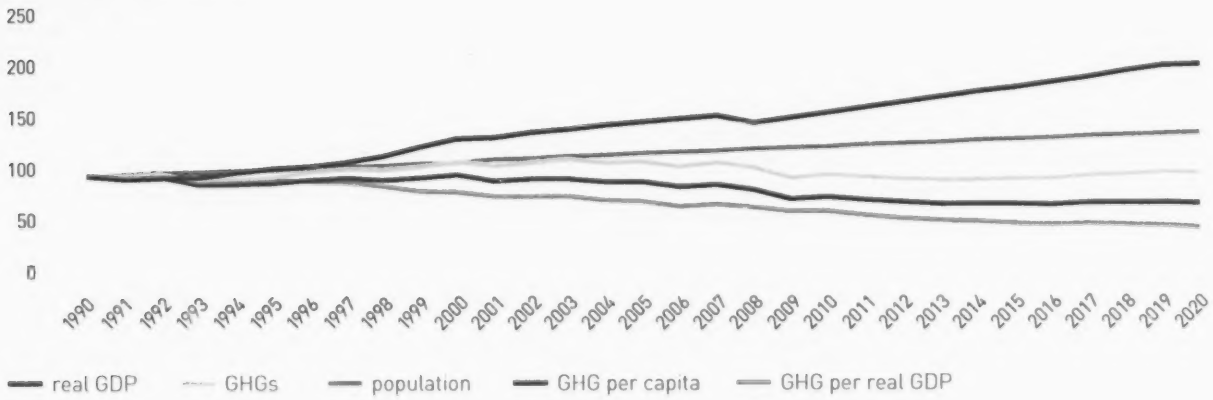
In 1990, for example, Ontario emitted an average of 17.1 tonnes of CO_2 eq per capita. By 2008, this had decreased by 14 per cent, to an average of 14.7 tonnes. As well, in 1990 the province emitted an average of 0.52 megatonnes for every billion dollars in real GDP. By 2008, this had decreased by 31 per cent, to an average of 0.36 megatonnes.

Table 3 shows Ontario's 2008 GHG emissions per capita and per dollar of real GDP, compared to other provinces in Canada.

TABLE 3.
PROVINCIAL GHG INTENSITY AND PER CAPITA

Province / Territory	GHG Intensity (Mt/$B GDP)	Rank	GHG per capita Tonnes/Capita	Rank
QC	0.30	1	10.6	1
YT, NWT, NU	0.34	2	20.0	7
ON	0.36	3	14.7	3
BC	0.40	4	14.8	4
PE	0.47	5	14.1	2
NL	0.51	6	19.9	6
MB	0.52	7	18.1	5
NS	0.72	8	22.3	8
NB	0.77	9	24.0	9
AB	1.32	10	68.1	10
SK	1.80	11	73.8	11

FIGURE 4.
EMISSION INTENSITIES



Short term trends in Ontario's emissions (2007 vs. 2008)

Between 2007 and 2008, Ontario's emissions decreased by 5 per cent — a decline of 9 Mt. The electricity sector saw a 15 per cent reduction in emissions, the largest decrease among all of the sectors. The second largest decrease in emissions came from the industrial sector where emissions from 2007 to 2008 fell by 7 per cent. These reductions are largely attributable to reduced emissions associated with electricity generation and a decreased demand for fossil fuels in the industrial sector.

The scope of provincial level data was expanded in the 2010 National Inventory Report to include the production and consumption of halocarbons. These GHG sources account for 1 per cent of Ontario's total emissions in 2008.

TABLE 4.
CHANGES IN ONTARIO'S EMISSIONS (2007-2008)

Ontario's GHG Emissions 2007-2008 (Mt CO_2e)

Sector	2007	2008	Variation (2007-2008)
Transportation	60.7	60.3	-1%
Industrial	55.7	51.8	-7%
Buildings	33.2	33.0	-1%
Electricity	32.0	27.4	-15%
Agriculture	10.7	10.3	-3%
Waste	7.4	7.4	+1%
Total	200	190	-5%

Emissions Modeling Overview

Reporting on the progress of Climate Change Action Plan initiatives and projecting future GHG emissions are essential to understanding Ontario's progress towards meeting its action plan targets.

As a result, Ontario's approach to modeling GHG emissions is updated periodically to incorporate refinements based on best practices and the latest data available. In addition, the projections of emissions reductions are adjusted as required to incorporate any changes to programs or policies.

The analysis contained in this report was finalized in Fall 2010 and represents the best available information at that time. Information that became available after that point in time has not been factored into the modeling results, **with the exception of the recently released Long Term Energy Plan (LTEP) and the government's latest emissions forecast for the electricity sector.**

This information was used to create:

1. *A Business as Usual (BAU) projection* — a projection that assumes that historical emission trends will continue, while accounting for the economic outlook in Ontario and excluding the anticipated future impact of emissions reduction initiatives that are both planned and underway.

2. *A Climate Change Action Plan projection* — a projection that accounts for the anticipated future impact of emissions reduction initiatives that are both planned and underway.

Third Party Validation

Starting with last year's annual report, the province took a historic step to have its emission reduction modeling methodology and assumptions validated by an independent third party. Ontario was the first jurisdiction to undertake a validation of its forward looking emission reduction forecasts.

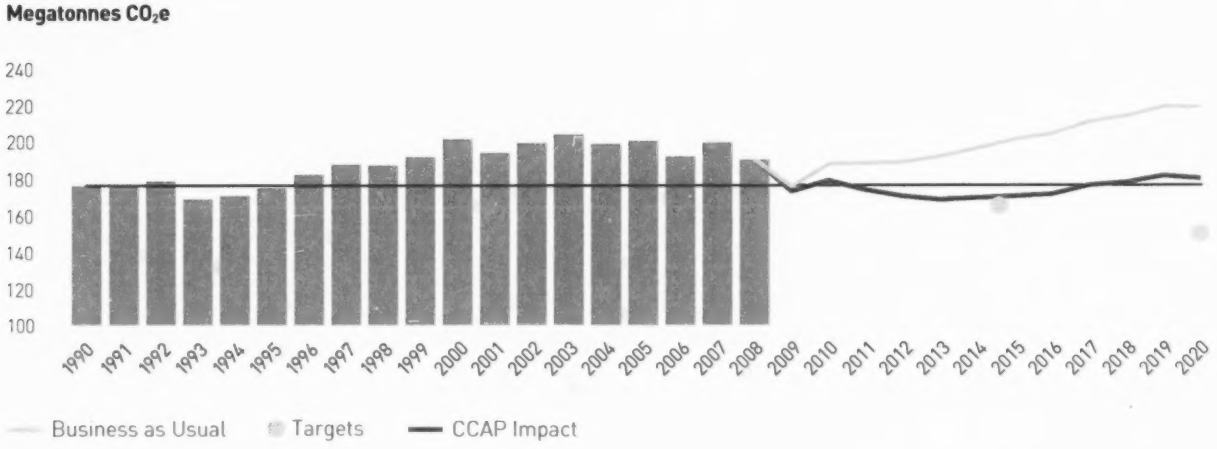
The government remains committed to present to the public, Legislature and the Environmental Commissioner of Ontario validated emission forecasts. However, given the release of the LTEP in November, and the importance of coal phase-out, it was not possible to complete validation in time for the release of this year's report, as the process typically takes several months to complete. **The province will continue to incorporate the latest information and secure validation in time for its next report.**

Updated Emissions Projection

As noted above, since the release of the 2009 Annual Report, the province's emissions forecasting model has been updated to reflect the best available information. In addition, to address recommendations provided in 2009 by the validator, the government adopted a single, internally consistent set of macroeconomic projections to underpin the emissions model.

The government is now projecting that including its current suite of initiatives Ontario will achieve approximately 88 per cent of the reductions required to meet the 2014 target. This forecast is improved over last year's report which forecasted progress of 71 per cent to the 2014 target. Progress to target in 2020 is forecasted to improve slightly to 57 per cent of required reductions. The change in forecasted progress reflects both revisions to modelling

FIGURE 5.
FORECASTED EMISSIONS



for the province's suite of current emission reduction initiatives and changes to the province's BAU scenario to reflect the economic downturn's impact on the province's economy.

Updating the BAU for the 2010 Annual Report

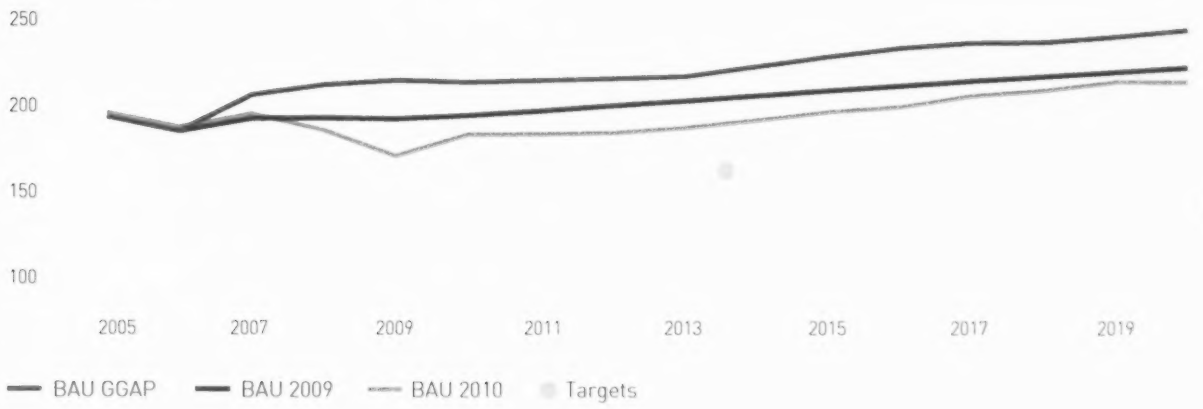
Similar to last year, the province's BAU scenario has been updated to reflect changes in historical emissions data, revised macroeconomic and sector growth forecasts, and enhancements to the underlying sector model based on emerging best practices. Once again this year the province's BAU scenario has been adjusted downwards to reflect the impact of the province's short- and medium-term economic outlook as a result of the global economic downturn.

TABLE 5.
PROGRESS TO TARGET COMPARISON

2010 Report	2014	2020
Projected Reductions (Mt)	27	39
Progress to Target	88%	57%
Gap (Mt)	4	30

2009 Report	2014	2020
Projected Reductions (Mt)	34	43
Progress to Target	71%	56%
Gap (Mt)	10-15	35

FIGURE 6.
UPDATED BAU SCENARIO



Updated Initiative Modelling

The province's suite of initiatives is projected to deliver GHG reductions totaling 27 Mt in 2014 and 39 Mt in 2020. These initiatives represent a combination of distinct GHG reduction efforts, such as provincial regulation requiring methane from landfills to be captured, and clusters of related efforts aimed at achieving a common goal, such as the coal phase-out and related renewable electricity and conservation activities. The initiatives cross all of the emission sources and sectors of the economy, and represent a blend of short-, medium- and long-term emission reductions. The initiatives include activities that are both within and outside the direct control of the Ontario government.

FIGURE 7.
REDUCTIONS BY SOURCE

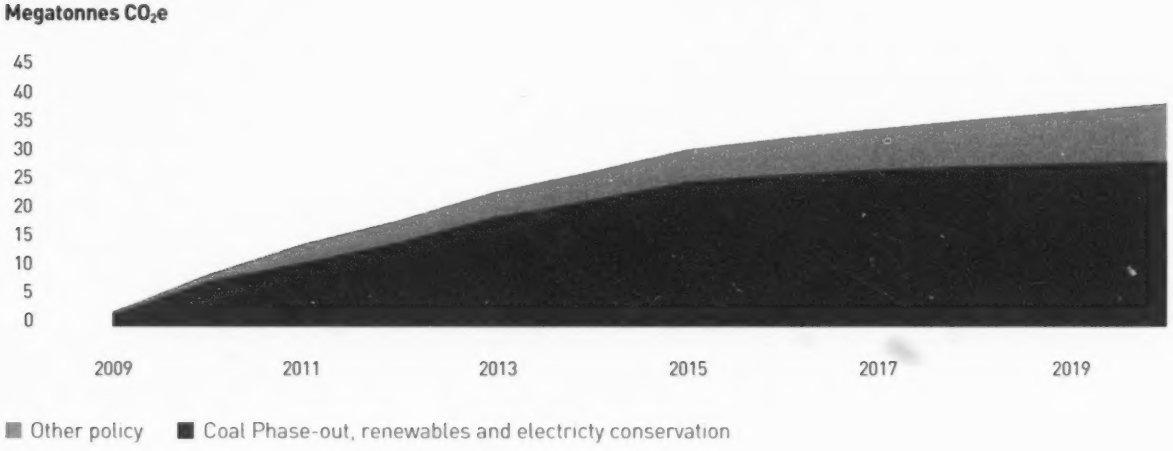


TABLE 6.
EMISSION REDUCTIONS BY SECTOR

Sector	Initiative Name	Projected Reductions (Mt) 2014	2020
Transportation:	■ The Big Move and Growth Plan for the Greater Golden Horseshoe ■ Passenger vehicle efficiency regulations ■ Freight truck speed limiter regulation ■ Hybrid buses and Green Commercial Vehicle Program	0.4	3.0
Industry:	■ Natural gas utility conservation programs	0.8	1.2
Buildings:	■ The Big Move and Growth Plan for the Greater Golden Horseshoe ■ Natural gas utility conservation programs ■ 2006 Building Code update ■ Furnace efficiency standards	2.1	4.0
Electricity:	■ Coal phase-out and related electricity policies	22.1	28.9
Agriculture:	■ Biogas Financial Assistance Program	< 0.1	< 0.1
Waste:	■ Landfill gas capture regulation	1.7	2.1
Total		**27.2**	**39.1**

Uncertainty Analysis

The reductions presented in this report, linked to the government's current GHG reduction measures, are based on a single set of economic, population, energy, and policy assumptions. As seen by the historical revisions to BAU projections, there are significant uncertainties inherent to any emissions projection.

For example, if real GDP and population are 1 per cent higher, combined with both 5 per cent more heating degree days and 5 per cent more cooling degree days — a cold winter and a hot summer — the projected impact on emissions would be three to four megatonnes, or about 2 per cent of total emissions. This impact, particularly as it pertains to real GDP, is a generalized impact. The impact can be significantly higher or lower depending on whether energy-intensive manufacturing is affected versus, for example, the services sector of the economy.

WORKS CITED

Energy Information Administration. *Annual Energy Outlook.* Washington, DC: Energy Information Administration, 2009.

Environment Canada. *National Inventory Report 1990-2008: Greenhouse Gas Sources and Sinks in Canada.* Ottawa: Environment Canada, 2010.

Environmental Commissioner of Ontario. *Broadening Ontario's Climate Change Policy Agenda: Annual Greenhouse Gas Progress Report 2010.* Toronto: Environmental Commissioner of Ontario, 2010: 11.

Ernst and Young. *Clean Energy Annual Report,* 2009.

HDR Corporation Decision Economics. *Costs of Road Congestion in the Greater Toronto and Hamilton Area: Impact and Cost Benefit Analysis of the Metrolinx Draft Regional Transportation Plan: Final Report.* Toronto: Greater Toronto Transportation Authority, 2008: A7-1.

Maas, Carol. *Ontario's Water-Energy Nexus: Will We Find Ourselves in Hot Water… or Tap into Opportunity?* Vancouver: POLIS Project on Ecological Governance, 2010: 9.

McKinsey & Company. *Pathways to the Low Carbon Economy.* McKinsey & Company, 2009.

Mediacorp Canada Inc. "2010 Canada's Greenest Employers." 2011. 15 Feb 2011 canadastop100.com/environmental/

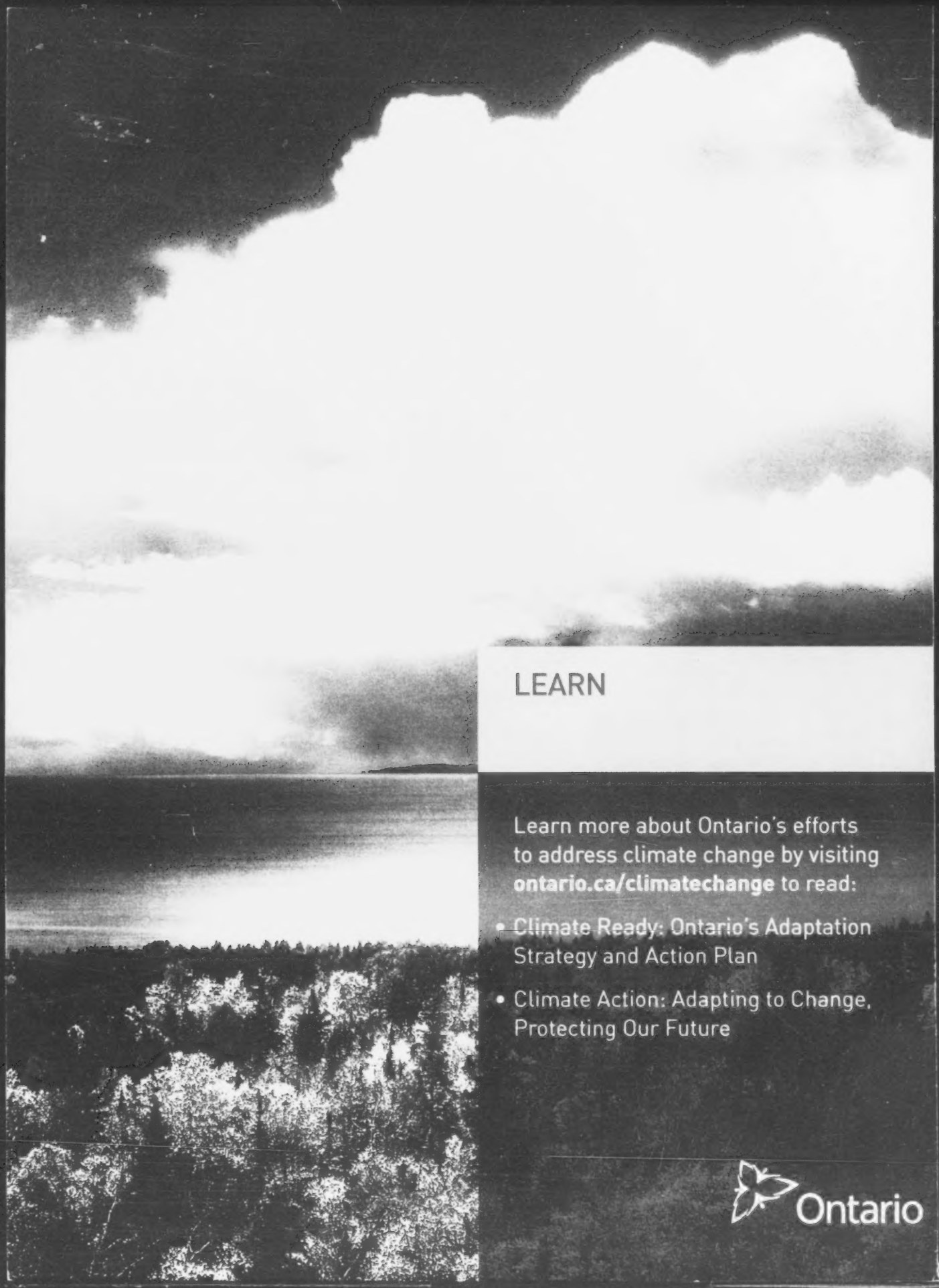
Ontario Ministry of the Environment. *Annual Report 2008-09, Climate Change Action Plan.* Toronto, ON: Queen's Printer for Ontario, 2009.

Ontario Office of the Premier. *Open Ontario – A Five-Year Plan for Our Economy.* ontario.ca/openontario

United Nations *World Water Assessment Programme. Water, A Shared Responsibility: UN World Water Development Report 2.* New York, NY: United Nations Educational, Scientific and Cultural Organization, 2006.

United Nations Development Program. *Charting a New Low Carbon Route to Development.* New York, NY: United Nations Development Program, 2009.

Yuen, Jenny. *Gore Green with Envy.* Toronto Sun. 25 Nov. 2009. torontosun.com/news/canada/2009/11/25/11915481-sun.html



LEARN

Learn more about Ontario's efforts to address climate change by visiting **ontario.ca/climatechange** to read:

- Climate Ready: Ontario's Adaptation Strategy and Action Plan
- Climate Action: Adapting to Change, Protecting Our Future

Ontario